AVIATION AND AIRCRAFT JOURNAL

NOVEMBER 22, 1920 VOL. IX. NO. 10

Member of the Audit Bureau of Circulations

INDEX TO CONTENTS

Editorials	313	Air Mail Extension	324
New Variable Surface Airplane	314	Fokker Studying the American Situation	325
U. S. Navy Airship D-2 Accepted	316	Situation in Naval Aviation	326
Forty-four Entries for Pulitzer Trophy Race	317	Air Mail in Haiti	327
Deeds of the Kosciusko Escadrille	318	New Speed Record	327
The Engineering Section of the Air Mail	319	Quarantine Regulations for Aircraft	328
First Pursuit Group Training	320	Stout Bat-Wing Tested	328
Proposed Transport Airplane	321	Chief of Italian Army Air Service	330
Special Inclinometers and Indicators	322	Aviators' Dinner at Hotel Astor	330

THE GARDNER, MOFFAT COMPANY, Inc., *Publishers*

HIGHLAND, N. Y.

HARTFORD BUILDING, UNION SQUARE, 22 EAST SEVENTEENTH STREET, NEW YORK

SUBSCRIPTION PRICE: FOUR DOLLARS PER YEAR. SINGLE COPIES FIFTEEN CENTS. CANADA, FIVE DOLLARS. FOREIGN, SIX DOLLARS A YEAR.

COPYRIGHT 1920, BY THE GARDNER, MOFFAT COMPANY, INC.
ISSUED EVERY MONDAY. FORMS CLOSE TEN DAYS PREVIOUSLY. ENTERED AS SECOND-CLASS MATTER MAY 19, 1920, AT THE POST OFFICE AT HIGHLAND, N. Y., UNDER ACT OF MARCH 3, 1897.

THOMAS-MORSE AIRCRAFT CORPORATION

Thomas-Morse Training 2-Seater in flight over Ithaca, N. Y.

THOMAS-MORSE AIRCRAFT CORPORATION

Curtiss

The following types of Curtiss planes are available for prompt delivery:

Orioles with OX Motors

Orioles with C-6 Motors

American J.N.'s with OX Motors

Canadian J.N.'s with OX Motors

Standard J-1's with OX Motors

Standard J-1's with K-6 Motors

Sea Gulls with C-6 Motors

An early issue of this publication will outline the Curtiss cooperative plan of sales for American pilots.

Ask for Curtiss quotations on all repairs for airplanes or flying boats for commercial use.

CURTISS AEROPLANE & MOTOR CORPORATION

GARDEN CITY, LONG ISLAND, N. Y.

Member Manufacturers Aircraft Association

AVIATION
AND
AIRCRAFT JOURNAL

Vol. IX NOVEMBER 22, 1920 No. 10

The Air Service Reserve

THERE has been much criticism of the Air Service Reserve from officers who have received commissions and who hoped that they might have an opportunity to continue their flying so as to be in training in case of their being ordered to active duty.

It appears, however, that little has been done in this direction by the Air Service because of general problems which must be settled before the War Department can give the reserve proper consideration. The Air Service like other branches of the Army has had to wait until the question of the National Guard and its future status is settled by Congress. As the all important matter of funds is involved little can be accomplished until the whole comprehensive plan is worked out and a decision reached.

What is needed are airdromes conveniently located where airplanes of all types are available for flying, with a small force of Air Service mechanics to keep the ships in good order. If even this opportunity were available the flying skill of ex-service pilots would not be entirely lost.

The Mechanical Evolution of the Airplane

IT is extremely interesting to watch the mechanical evolution of the airplane. In the early stages of its development so much difficulty was experienced in securing the necessary elements of structural strength for a purely static structure such as the wings—static in a structural sense, even though dependent on dynamic reaction for their sustention—that a school of designers was formed which regarded satisfactory static strength as a great achievement, and the inclusion of any moving parts as fraught with a danger and difficulty. The designer sought to avoid the inclusion of all mechanical devices in the airplane.

Within the last two or three years we have seen the employment of a retractible chassis, of amphibious gears, of variable area for the airplane proper, and systems of gearing for the power units. These innovations have not been achieved at any expense of life or even destruction of the planes. These and other devices promise a greatly increased performance and a greater sphere of usefulness for the airplane. The mechanical evolution is justified, and there is a probibility of the rapid continuation of this evolution.

The Future of the Club

THE future of the Aero Club of America is a matter of great importance to everyone interested in the development of American aeronautics. The club idea appears to have come to a point where a difference of opinion among the members may have a serious effect on matters of greater moment.

Three views appear to have been expressed by as many different groups. The present policy seems to be to continue the club as a national organization with greater representation from the country at large and an adequate club house. Others in the club express the belief that the club house should be more of a local affair and the government of the club be entrusted to men who can give personal attention to the management of the organization. Another group feels that at present, an adequate club house is impossible to maintain owing to the high rents and expense of running a restaurant with a limited partonage, and would have the club secure comfortable offices and limit the expenditures to the probable revenue. This group, too, believes in expanding the membership by lower dues into an association which will have members from every locality in the United States.

The new Board of Governors and the new officers can clarify the situation by issuing a statement of their plans at an early date.

Fin Areas with Streamline Fuselages

UNDOUBTEDLY one of the most important features to be realized in an airplane, is what we may call directional stability. This may be briefly, and perhaps loosely defined as the ability of an airplane to head into a side wind. A directionally unstable airplane tends to head away from the side wind, and therefore to yaw dangerously off its course. Instability of this character is easily corrected by placing sufficient fin area in the rear of the machine. The amount of such fin area is determined from empirical considerations.

To Capt. J. B. Patterson of McCook Field is due the credit of recommending particular care in using large fin area, where a tractor fuselage is well streamlined. The streamlining of a fuselage improves performance naturally, but at the same time renders the fuselage much more directionally unstable, than is the case of a fuselage with a large flat side area in its front portions. Where fin area has been empirically proportioned without due consideration of the streamlined fuselage serious directional instability may result, and this has indeed been the case in one or two recent designs.

New Airplane Design

IT will probably take another war to bring to the attention of the public the real progress that is being made throughout the world in the design of airplanes. It can be said, without any secrets being disclosed, that if the public knew the internal activity of the designers of military and naval aircraft in all countries, it would be amazing news.

Just how far such information will be given to the public is a matter for the intelligence departments to determine but when new types of machines are broadly discussed at the time bids are requested, and are made in factories where there is little or no attempt at secrecy, it seems unfortunate that more news is not available regarding development work.

Recently several new types of military airplanes have been under discussion and many are under construction. What real satisfaction it would give the public to know that the appropriations for aeronautics were producing something which may be the country's first line of defense in a future war.

The New Variable Surface Airplane

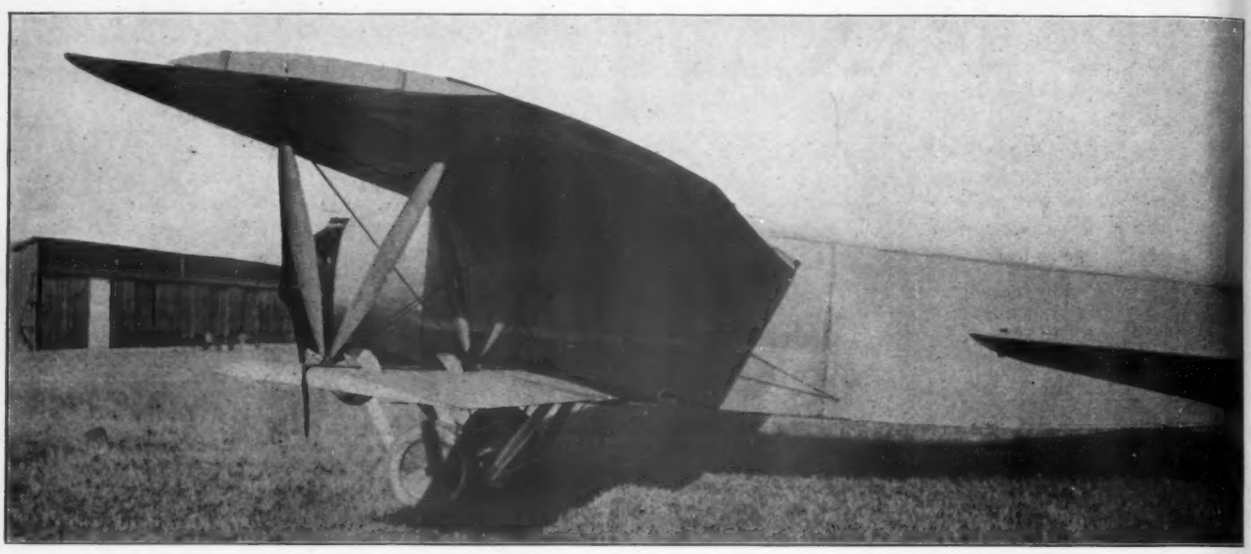
By H. M. Buckwald, M.E.

A recent French development, the Levavasseur and Gastambide variable surface airplane is a tractor biplane fitted with a 250 hp. Salmson engine. The novel feature of this design enables the pilot to vary the surface, while in flight, from 345 sq. ft. to 560 sq. ft. or a ratio of 3 to 5.

The area of the bottom wing is fixed, the upper wing alone being adjustable. The latter is composed of three parts, two

French aeronautical engineers who designed the Antoinette monoplanes of 1908, on which the first attempt to cross the English Channel was made. The present variable surface machine was built under the auspices of Mr. Latham, a cousin of the celebrated early pilot Herbert Latham.

Two large types of this airplane have been constructed. No. 1 has a large round fuselage, and is well streamlined

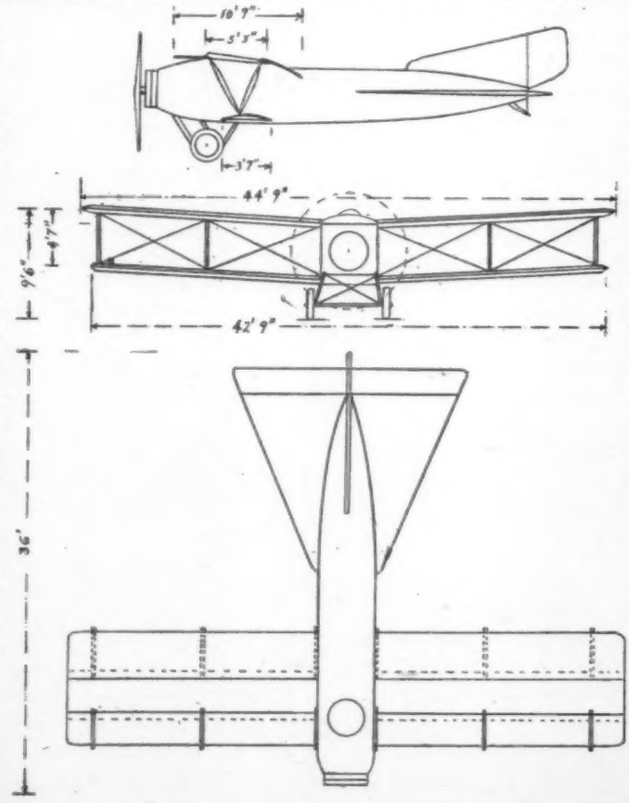


THE LEVAVASSEUR AND GASTAMBIDE VARIABLE SURFACE BIPLANE WITH WINGS OPEN: CHORD 10 FT. 9 IN.

of which are sliding. The middle section remains fixed; the lower one slides forward, while the upper one slides backward. The chord thus varies from 5 ft. 3 in. to 10 ft. 9 in. The front panel which is flat, displaces horizontally, while the rear portion which is curved, moves backward and downward. Thus the camber varies and also the angle of incidence. When fully open, the trailing edge is 12 in. below the leading edge, and the angle of incidence has passed from 3 deg. to 5½ deg.

The great difficulty in the design of a variable surface airplane is to keep the center of pressure stationary, irrespective of the surface, any displacement of the center of pressure causing longitudinal instability. In this machine, the wing chord grows simultaneously the same amount, in front and in rear. The motion of the trailing edge is along a circular arc, and the wing is so designed that at all developments of surface, the center of pressure rests constant, or at least practically so.

Levavasseur and Gastambide the designers are two eminent



ELEVATIONS AND PLAN OF LEVAVASSEUR AND GASTAMBIDE VARIABLE SURFACE BIPLANE

The mechanism for moving the surfaces is a system of rigid links. No. 2 which forms the subject matter of this article has an ordinary rectangular fuselage and is solidly constructed throughout. No attempt has been made at streamlining, the idea being to produce a machine that would be rigid and strong, and well capable of passing government tests for both strength and performance. The change of surface of No. 2 is made by means of cables.

Successful flights have been made at Etampes, France, machine No. 2 having been flown about fifteen times. The pilot, Mr. Grandjean, states that the maneuverability is excellent. Public flights have recently been made before aeronautical experts and government authorities. Few persons among the thousands who were at Etampes on September 28, for the Gordon Bennett race, and who admired the variable camber feature of the Dayton Wright entry, knew that in a hangar at one side of the field, was an airplane that not only had variable camber, but variable surface and variable incidence. This machine it

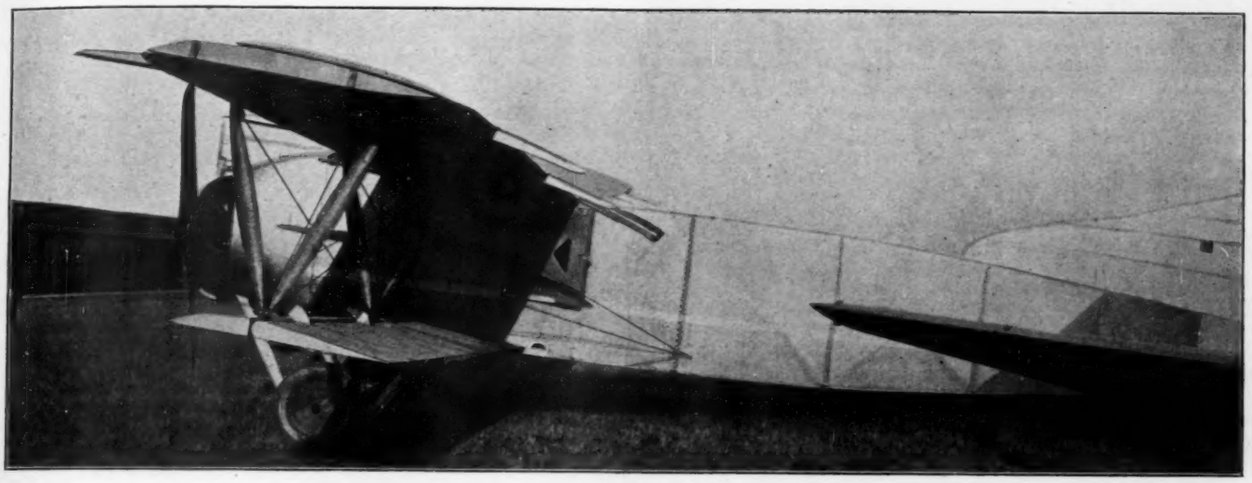
is thought will secure the 100,000 franc prize offered by the Union for the Safety of Airplanes, on account of its high normal speed and low landing speed.

The present machine is a result of three years of study and design. Tested with a sand load, in accordance with the method prescribed by the Technical Section of French Aeronautics, by whom the airplane will be bought for the French Army, it showed a factor of safety of six, with wings fully open.

tudinal shaft, there is connected a cord which is rigged to a pencil and revolving drum, so that after the flight is over, one can see the setting of the chord at which the take-off, the full speed, the minimum speed, etc., were made.

The Wing Cell

There is no center section. The upper and lower wings are set at a 3 deg. dihedral, and are in two sections, which are attached to the fuselage. The wing frame-work is of wood, as are the main sections as well as the sliding panels. The



THE LEVAVASSEUR AND GASTAMBIDE VARIABLE SURFACE BIPLANE WITH WINGS FOLDED: CHORD 5 FT. 3 IN.

Varying the Surface

To vary the surface, the pilot just turns a wheel, at his side. The surfaces, equipped with metal rollers which move in metal grooves, slide in or out. The whole operation of either increasing or decreasing the surface takes about three minutes.

The accompanying diagrams show the principle. At the pilot's right side is found the vertical wheel which transmits the rotation to the right longitudinal shaft, by means of bevel gears. The two longitudinal shafts are connected by a chain. At the rear end of each shaft, there is a phosphor-bronze drum on which the cables wind and unwind. The diagram shows a simple arrangement of the mechanism, freed from auxiliary parts which would make it more difficult to understand. In reality, two cables wind and two cables unwind on each drum, instead of one, as shown. Also four auxiliary control cables connect the right and left wings at the leading edge. It will easily be seen that many variations can be used.

To the right longi-

covering is cloth. The upper wing has three boxed spars 1½ in. wide by 3 in. high, running through the central fixed portion. The lower wing has only one spar which is of the boxed type 3 in. x 3 in. The two wings are separated on each side by two pairs of metal struts set at a V. The interior metal tube is faired off by sheet metal, giving the struts the exterior forms, as shown in the photos. The bracing cable is of the flat swaged type. The wings are well braced. In addition to the ordinary interwing wires, there are bracing wires from two points of the fuselage, one at the nose and the other from a point half-way between the nose and the tail. There is also a wire from the landing gear to a point on the lower wing at the first strut station. The ailerons are, of course, only on the bottom wings.

When the wings are fully retracted, there is the parasite resistance of the wooden supports for bracing the panels, when extended. There are two arms in front, and two in rear of each wing, situated at the struts. The panels slide on these arms. On each side of the arms in a semi-circular metal groove, into

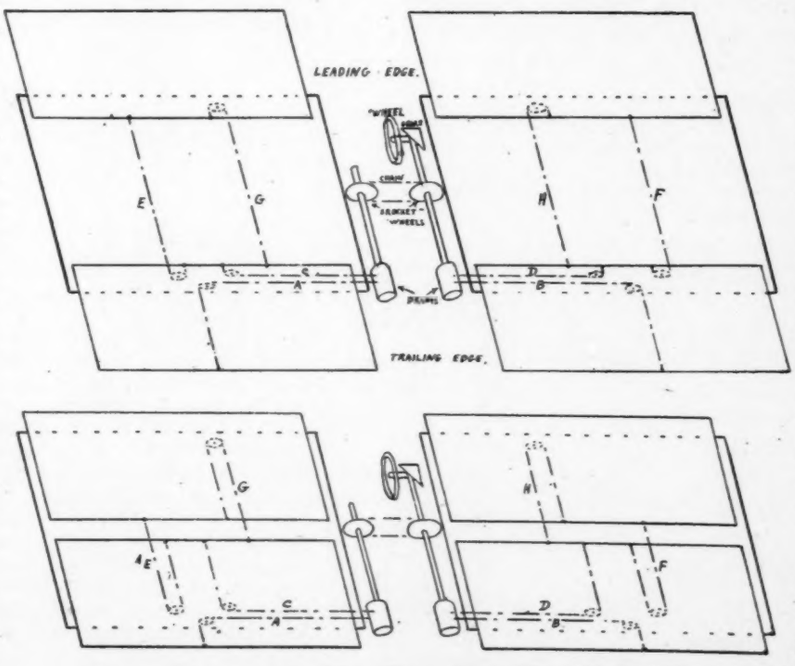


DIAGRAM ILLUSTRATING HOW WING SURFACE IS CHANGED ON THE LEVAVASSEUR AND GASTAMBIDE VARIABLE SURFACE BIPLANE

In the upper diagram, the wings are shown open. To close the wings cables *A* and *B* are pulled. The rear panels move toward the leading edge and in so doing they pull the front panels toward the trailing edge by means of cables *E* and *F*. During this operation cables *C*, *D*, *G* and *H* are slack.

The lower diagram shows the wings closed. To open the wings cables *C* and *D* are pulled. The rear panels move back and cause front panels to move forward by means of cables *G* and *H*. Cables *A*, *B*, *E* and *F* are slack.

All pulleys are secured in the central portion of the wing.

which fit substantial rollers, the latter being attached to the panels. In the case of the leading edge surface during flight, it presses up against the arms, which now serve as a brace. In the case of the trailing edge surface, it appears that the only bracing is the engagement of the rollers in the grooves.

The top side of the bottom wing is practically an arc of a circle. This is also the case with the upper wing when closed. The bottom side is, in both cases, flat.

The Fuselage

The fuselage is of the ordinary boxed girder variety, and is very large. It occupies the entire gap. The pilot's post is rather high, his neck being on a level with the top surface. His visibility is good.

The Tail

The tail is exceptionally large, all of the surfaces having huge dimensions. No doubt this was done purposely for stability at slow speed; the wing ailerons are also rather large. The tail parts are made of wood, and covered with cloth. The stabilizer is a plane surface and is ordinarily non-supporting. However its incidence can be adjusted on the ground. The rudder is entirely above the center line of the fuselage, and the elevator is thus made in one piece.

The tail skid is of curious design. No metal is used, and there is no shock absorber. The skid is built up like a leaf spring of four planks of wood, each about ¾ in. thick. The whole arrangement is rigidly fixed to the fuselage, there being no hingeing of any sort. This skid is said to be resilient and durable. Perhaps the low landing speed accounts partly for its durability.

The Landing Gear

In general, the landing gear resembles the Breguet. There are three wooden struts on each side, separated at the bottom by two spacer tubes, between which rests the axle. The axle is not streamlined. The shock absorber is of ordinary design. The whole chassis is strongly braced with eight wires. For a machine whose landing speed is so low, it seems as if it could have been designed with one-half of its present weight.

The Power Plant

The Salmson 250 hp. engine is similar to that which is giving excellent results on the Farman Goliath passenger planes that fly between Paris and Brussels, daily. There is a starting magneto in the cockpit.

The propeller is an "Integral" and revolves anti-clockwise when viewed from the pilot's seat.

Characteristics

DIMENSIONS

Span, upper wing	44 ft. 9 in.
Span, lower wing	42 ft. 9 in.
Chord, lower wing	3 ft. 7 in.
Chord, upper wing (min.)	5 ft. 3 in.
Chord, upper wing (max.)	10 ft. 9 in.
Gap	4 ft. 7 in.
Height	9 ft. 6 in.
Overall Length	36 ft. 0 in.
Width of fuselage (max.)	4 ft. 7 in.

AREAS

Upper wing (min.)	210 sq.ft.
Upper wing (max.)	425 sq.ft.
Lower wing (including ailerons)	135 sq.ft.
Total surface (min.)	345 sq.ft.
Total surface (max.)	560 sq.ft.
Area of ailerons (total)	47 sq.ft.
Area of stabilizer	95 sq.ft.
Area of fin	25. sq.ft.
Area of rudder	16 sq.ft.
Area of elevator	35 sq.ft.

WEIGHTS

Weight empty	2750 lb.
Weight of pilot	130 lb.
Weight of fuel and oil	220 lb.
Weight total	3100 lb.
Lift loading (max.)	9 lb./sq.ft.
Lift loading (min.)	5.5 lb./sq.ft.
Power loading	12.4 lb./hp.

AERONAUTICAL DATA

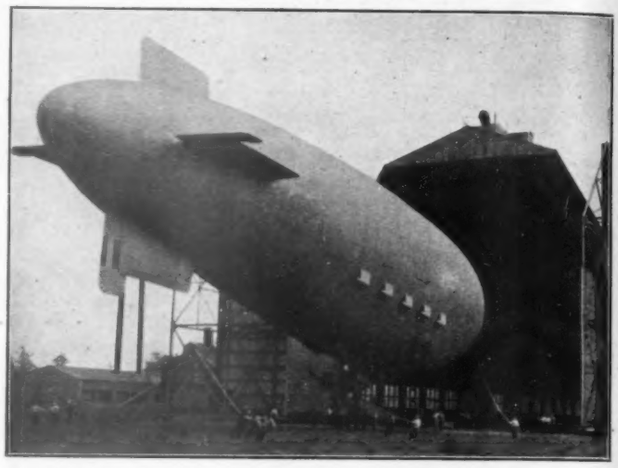
Stagger (min.)	12 in.
Stagger (max.)	36 in.
Dihedral	3 deg.
Angle of incidence, lower wing	3 deg.
Angle of incidence, upper wing (min.)	3 deg.
Angle of incidence, upper wing (max.)	5½ deg.

PERFORMANCE

Maximum speed	125 m.p.h.
Minimum speed, level flight	35 m.p.h.
Landing speed	30 m.p.h.
Ceiling	25000 ft.
Gliding Angle	1 in 10
Engine	250 hp. radial, Salmson, 1400 r.p.m.
Propeller	"Integral," diameter, 9 ft. 6 in.

U. S. Navy Airship D-2 Accepted

The Naval Airship D-2 left Akron, Ohio, at 2:03 a. m. Sunday, October 31, and landed at Langley Field, Va., at 12:45 P.M. the same day. This airship passed over Washington, D. C. about 8 o'clock. Its Commanding Officer was Lieut. C. E. Bauch, U. S. Naval Reserve Force, who has been in charge of its trials. The other members of the crew were: Lieut. (jg.) A. T. Sewell, U. S. Naval Reserve Force, Chief Machinist's Mate Robert Farris, U. S. Navy, and Chief Quartermaster J. F. Shade, U. S. Navy. Lt. McIntyre, A.S.A., was a passenger.



THE D-2, THE LARGEST AMERICAN BUILT AIRSHIP

This airship is the largest built in the United States. Its gas capacity is 186,000 cubic feet; length 198 ft.; height 58 ft.; diameter 42 ft.; cruising radius, 750 miles. The design and specifications were prepared by the Bureau of Construction and Repair of the Navy, and the car was manufactured at the Naval Aircraft Factory, Philadelphia, Pa. The envelope was built by the Goodyear Tire and Rubber Company, and the ship was erected at th Goodyear Flying Field near Akron. The Navy test crew have been conducting the trials of this airship at Akron, Ohio, and the successful flight from Akron to Langley Field was carried out as an endurance flight in connection with the trials.

The Navy will turn this ship over to the Army Air Service for its use, as was done in the case of the Navy's "Zodiac" airship built in France during the war for use at the Naval Air Stations on the French Coast—the airship that has recently made several flights from Langley Field to Washington.

The abandonment of many Naval Air Stations, on the coasts of France, Ireland, and the United States, since the armistice has greatly reduced the Navy's available shed space, and excess ships have been turned over to the Army, at their request, by the Navy. The existing Naval Air Stations in the United States will be greatly augmented in the summer of 1921 by the completion of the world's largest airship hangar at Lakehurst, N. J., and of a second large rigid airship shed at the Naval Air Station, Cape May, N. J.

Flying Pay Decision

An officer of the Air Service is not entitled to receive flying pay for six days when on hunting leave and absent from his post. The Comptroller has held that a Navy officer on temporary duty not requiring flights is not entitled to flying pay, when the language of the statute is less restrictive than the statute applicable to the Army. The opinion of the J.A.G.'s office of April 8, 1920, is overruled.

Forty-Four Entries for Pulitzer Trophy Race

A field of forty-four starters for the Pulitzer Trophy air race at Mitchel Field, Mineola, Thanksgiving Day, is shown by the list of entries made public by the Aero Club of America. With few exceptions they are all Army, Navy and Marine Corps fliers.

Two SVA's have been entered by the Aero Import Co., one S.V.A. by the Eagle Flying Corp. and Morane Saulnier Co. have entered one of their planes. In addition to the American built machines France, England, Italy and Germany are all represented by their leading planes all of which with two privately owned exceptions having either been constructed or redesigned in America.

List of Entrants Pulitzer Trophy Contest

Flight I

AIRPLANE	MOTOR	PILOT	ENTRANT
Thomas-Morse (Am)	Wright 300 hp. (Am)	Capt. H. E. Hartney	U. S. Army
Fokker (Ger)	Packard 300 hp. (Am)	Major C. H. Walsh	U. S. Army
Thomas-Morse (Am)	Wright 300 hp. (Am)	2nd Lieut. Leigh Wade	U. S. Army
Ordnance (Am)	Wright 300 hp. (Am)	2nd Lieut. O. G. Kelly	U. S. Army
Ordnance (Am)	Wright 300 hp. (Am)	Capt. Maxwell Kirby	U. S. Army
Loening Special (Am)	Wright 300 hp. (Am)	Lieut. B. G. Bradley, U. S. M. C.	U. S. Navy
Sopwith Dolphin (Br)	Wright 300 hp. (Am)	Lieut. C. E. Haynes	U. S. Army

Flight II

De Haviland (Am)	Liberty 400 hp. (Am)	2nd Lieut. Carl Eliason	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	2nd Lieut. J. B. Wright	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	Lieut. (jg) V. C. Finch	U. S. Navy
De Haviland (Am)	Liberty 400 hp. (Am)	2nd Lieut. Ray W. Brown	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	Lieut. Walter R. Lawson	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	Capt. H. B. Mims, U. S. M. C.	U. S. Navy
De Haviland (Am)	Liberty 400 hp. (Am)	Major Davenport Johnson	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	Capt. Norbert Carolin	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	2nd Lieut. Merrill D. Mann	U. S. Army

Flight III

De Haviland (Am)	Liberty 400 hp. (Am)	2nd Lieut. Lucas F. Beau	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	2nd Lieut. Lawrence Claude	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	Lieut. John P. Roullot	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	2nd Lieut. R. C. Moffat	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	Lieut. F. O. Rogers, U. S. M. C. Army	U. S. Navy
De Haviland (Am)	Liberty 400 hp. (Am)	Capt. Horace N. Heisen	U. S. Army
De Haviland (Am)	Liberty 400 hp. (Am)	Lieut. (jg) D. L. Conly	U. S. Navy
De Haviland (Am)	Liberty 400 hp. (Am)	Lieut. Charles M. Cummings	U. S. Army

Flight IV

Vought V.E.-7 (Am)	Wright 180 hp. (Am)	Lieut. (jg) W. B. Gwyn	U. S. Navy
Vought V.E.-7 (Am)	Wright 180 hp. (Am)	Lieut. (jg) A. Laverents	U. S. Navy
Vought V.E.-7 (Am)	Wright 180 hp. (Am)	2nd Lieut. L. H. Sanderson, U. S. M. C.	U. S. Navy
Vought V.E.-7 (Am)	Wright 180 hp. (Am)	2nd Lieut. W. V. Brown, U. S. M. C.	U. S. Navy
Vought V.E.-7 (Am)	Wright 180 hp. (Am)	Gy. Sgt. J. K. Dunn, U. S. M. C.	U. S. Navy
Vought V.E.-7 (Am)	Wright 180 hp. (Am)	Ensign W. J. Daly, U. S. M. C.	U. S. Navy

Flight V

S.E.-5 (Br)	Wright 180 hp. (Am)	Lieut. Lotha A. Smith	U. S. Army
S.E.-5 (Br)	Wright 180 hp. (Am)	2nd Lieut. S. M. Aimes	U. S. Army
S.E.-5 (Br)	Wright 180 hp. (Am)	Capt. Felix Steinle	U. S. Army
S.E.-5 (Br)	Wright 180 hp. (Am)	2nd Lieut. F. A. Johnson	U. S. Army

Flight VI

Loening (Am)	Wright 300 hp. (Am)	Lieut. (jg) P. E. Gillespie	U. S. Navy
Ansaldo S.V.A. (It)	SPA 200 hp. (It)	Arthur W. Fox	Eagle Flying Corp.
Spad (Fr)	Hispano 220 hp. (Fr)	Lieut. St. Clair Street	U. S. Army
Ansaldo S.V.A. (It)	SPA 200 hp. (It) (Am)	Willis P. Taylor	Aero Import Co.
Loening (Am)	Wright 300 hp. (Am)	Lieut. (jg) J. F. Wolfer	U. S. Navy
Ansaldo S.V.A. (It)	SPA 225 hp. (It)	Albert Acosta	Aero Import Co.
Morane Saulnier (Fr)	LeRhone 110hp. (Fr)	Charles Colt	Morane Saulnier

Flight VII

Curtiss Triplane (Am)	Curtiss Model K 450 hp. (Am)	Lieut. Cdr. W. B. Haviland	U. S. Navy
Curtiss Triplane (Am)	Curtiss Model K 450 hp. (Am)	2nd Lieut. W. D. Culbertson, U. S. M. C.	U. S. Navy
Verville (Am)	Packard 600 hp. (Am)	Lieut. C. C. Mosley	U. S. Army

NOTE: (Am) American manufacture, (Br) British, (Fr) French, (It) Italian, (Ger) German. The Wright motors are the Hispano Type.

The fastest planes in the country and the most expert fliers of the Nation's military forces will fly in the 160-mile race. Some machines of types few of the public have seen will participate.

The Verville-Packard made for the Gordon Bennett Cup race at Etampes, France, will be flown by Lieut C. C. Moseley.

Every plane entered is capable of better than 100 miles an hour and the winner is expected to show close to 180 miles.

The Contest Committee, realizing that there would be many airplanes of the same type or design, for example, DH's, Loening, Vought, etc., entered for the Pulitzer Trophy has created additional interest among contestants and spectators by having class races, at the same time as, and in addition to the Pulitzer Trophy race.

For example, when a DH entry is received, it is placed in the DH class and will start with the other DH airplanes, which will give them a race among themselves for a DH class prize, although they are competing for the Pulitzer Trophy against all other entries. In using the word "type" of airplane on the entry blanks, the Aviation Committee intended this to be interpreted as the DH type or the Vought type or the Loening type, etc. However, all planes and motors eligible for the class prizes must have been built under the same broad specifications and not altered to materially change these specifications. A broad ruling has been made as follows:

The parts of airplanes eligible for class prizes and their motors must be interchangeable so that if any one or more parts of any two planes or their motors should be exchanged, the two planes would be identical after the change, from a standpoint of design and operation. Exceptions will be made in the case of the motor parts used in the high and low compression in the Liberty and Hispano motors, and of any kind of streamlining which does not alter the structure of the part or parts so streamlined.

The following Additions to the Conditions of Contest have been announced

(10) All airplanes may compete with pilot only.

(11) No contestant shall be permitted to "dope" the fuel with picric acid, ether, or similar highly-explosive liquids. Benzol and similar fuels may be used.

The contestants will be started in seven groups, or flights, in the order given in the list of entrants. In addition to the Pulitzer Trophy, Flight No. 1 is competing for Contest Committee Invitation Prize. Flights Nos. 2 and 3 are competing for the de Haviland Class Prize; Flight No. 4 for the Vought Class Prize; and Flight No. 5 for the S.E.-5 Class Prize.

The Aviation Committee announced that electric timing will be installed over a mile and a kilometer course on November 23 and 24, in order that any plane desiring, or any entry for the Pulitzer Trophy requested by the Contest Committee to fly over the course for air speed, may do so. These trials could be witnessed by officials of the Contest Committee of the Aero Club of America, so that any records made would be official, and recognized by the Federation Aeronautique Internationale.

Deeds of the Kosciusko Escadrille

Lieut.-Col. Cedric E. Fauntleroy, commander of the Polish Air Forces, Southern Front, has returned to the United States and is creating a great interest in behalf of Poland by addressing meetings throughout the country. He is endeavoring to recruit pilots, obtain equipment and secure funds for the Kosciusko Escadrille.

Col. Fauntleroy has made public a message from the Polish people who feel that, unless Bolshevism falls early the coming year, Poland will be overrun and all of Europe laid open to the peril of radicalism. "Two things are needed," said Col. Fauntleroy, "bread and aircraft. The Reds implant their doctrine successfully where there is famine, and Poland is starving. The Russian armies, in their attack on Poland, have been made up chiefly of cavalry, and the Polish Air Service is credited with having stopped the advance of these forces. Poland can defeat Bolshevism in battle only in the air. In other respects we are outnumbered ten to one. Poland's last remaining line of defense, should food relief measures from America and the Allies fail, is in the air. The Air Service, which is officered mainly by Americans, stands between freedom in Central Europe and the domination by the Reds."

Col. Fauntleroy for the first time told the story of Americans' participation in the Polish struggle for independence, which did not begin until the close of the World War. He accepted a commission at $500 a month, then learning the straits to which the Warsaw government was put, voluntarily went on the Polish payroll at $20 a month, as did other Americans. Of these there are now only three left in the service, but seven more have signed and Fauntleroy hopes to take others back with him. Fauntleroy is in command of the Air Forces on the southern front, which extends from Pinsk to the Roumanian frontier. He has never had more than 80 men and 25 machines, of which, except on rare occasions, no more than 10 were in condition at one time.

"In the air fighting in Poland since the Armistice," said Col. Fauntleroy, "is seen an indication of the certain warfare of the future. Aircraft, in my opinion, will dominate. Our equipment was such as we could obtain in Paris or pick up from enemy fields. Our work was ground harrassment and bombing and we operated generally from 15 to 75 feet from the ground, so that our machine gun fire would not be wasted.

"Many of our fliers operated singly. Capt. George M. Crawford, of Wilmington, Del.—one of the three original Americans left—while flying south of Kieff, saw six boat loads of troops crossing a river. All the incendiary ammunition in the Polish army—only 500 rounds—was in his machine. He dived and fired into the biggest boat, literally black with soldiers. The vessel was fired and sunk and the troops cast into the river.

"Two days later Crawford attacked the Red army, numbering 35,000, while on inspection. He began firing at 75 feet and we counted 80 men and 120 horses slain.

"Our squadron was on the front from March 10 to September 22, 1920. In that time we operated from 27 different fields. We attacked the Red army on June 29, 30 and July 1 and 2 and forced four retreats. We were cited by the Polish Chief of Staff in Warsaw. 'Though the Americans are tired by continuous service' read the citation, 'they continue to fly like crazy men; carry on liaison with our isolated units and attack the enemy cavalry at an altitude of 15 feet, splitting their skulls in all directions by their machine gun fire.'

"At Lemberg we attacked the Red army with 18 planes, of which 13 were different types. In two days we made 126 raids, dropped 8,500 kilos of bombs and fired 58,000 rounds of ammunition. From Aug. 10th to September 15th we made 398 flights, shooting 168,000 rounds and dropping 35,000 kilos of bombs. The commanding general of the southern front sent a dispatch to the chief of staff: 'If you can substitute 100 airplanes for all infantry on the front I will be able to stop the Bolshevik advance.' The chief of staff agreed but was unable to provide the aircraft. But even with what we had, we did stop the Red attacks in the south, obtaining confirmation through intelligence officers from the commander of the enemy forces himself. I think it just to the squadron to repeat that Poland gives to its Air Service credit for saving the country. The Red advance in the north, if duplicated in the south, would have meant the fall of the republic."

New Commanding Officer in Montgomery, Ala.

Major William Fitzmaurice has recently assumed the duties as commander of the Aviation Repair Depot, Montgomery, Ala., relieving Major Frank Lackland who has been in charge for the past several months and who is to go to an aeronautical school in Dayton, Ohio. For several years Major Fitzmaurice was a commissioned officer in the infantry and is an experienced military man.

The Engineering Section of the Air Mail

The Division of Air Mail Service, Post Office Department, has recently established an Engineering Section. This change in organization was found desirable principally because of the increase in the scope of the service, which now operates daily between New York and San Francisco with routes between Washington and New York and between St. Louis, Chicago and a line soon to be put into operation between Chicago and the twin cities St. Paul and Minneapolis.

It may seem strange that an organization operating such a highly technical service should not before have had such a department, but the engineering problems have heretofore been handled by the department head in conjunction with an advisory board and a consulting aeronautical engineer. Such an arrangement was found to be very satisfactory during the first two years of the service, but with the considerable extension and in view of the experiences of these two years of development, it became apparent that the engineering problems of the service warranted the undivided time and attention of a chief engineer and at least a small purely engineering organization.

LEON B. LENT, SUPERINTENDENT OF ENGINEERING, AIR MAIL SERVICE

And it may be said that the desire of Otto Praeger, Second Assistant Postmaster General, to have some, at least, of the experiences of the Air Mail Service reduced to concrete form and made useful to all interested in commercial aviation, hastened his decision to create this department before he left for Spain to represent the Post Office Department at the International Postal Congress in Madrid.

The Air Mail has had an opportunity to become well acquainted with the exacting necessities connected with daily flights on schedule during all kinds of weather, much of it the severe weather of last winter. It has met and solved many problems which make possible such daily flights and it is Mr. Praeger's desire that the aviation public be given full advantage of any knowledge gained. It is therefore hoped that the Department of Engineering will not only be useful in increasing the efficiency of the Air Mail Service, but will find it possible to present informatin in form useful to aviation in general, especially in the commercial operation of airplanes.

Major Leon B. Lent, who has been the general superintendent since the first of the year, was made superintendent of engineering and placed in charge of this work. Charles I. Stanton, one of the older officials of the service, and formerly chief of supplies and maintenance, was made superintendent of operations and Carl Egge was appointed superintendent of mail transportation. These men are directly under the executive head of the Service, Otto Praeger.

Major Lent is a graduate of Stevens Institute of Technology of the Class of 1897. For twenty years he followed the profession of mechanical engineering. He has engaged in power plant work and later in the design, construction and operation of gas engines and gas power plants, including the large gas power plant at the Detroit factory of the Ford Motor Co.

He entered the Army as captain in June, 1917. He was stationed at the Curtiss plant, Buffalo, N. Y., in connection with the development of airplane engines. He was transferred to Langley Field, Va., in Aug., 1917, and served as engineer officer. He started flying here. He was transferred to Camp Vail, N. J., and was stationed there from April, 1918, to November 11, 1918, as officer-in-charge of the flying section. Promoted to major in August, 1918, he left Camp Vail with complete flying personnel for overseas duty, but on signing of armistice was sent to Roosevelt Field and subsequently was commanding officer of Brindley Field and of Roosevelt Field.

Major Lent has flown about 600 hours.

He is a member of American Society of Mechanical Engineers, the Engineers Club, the Aero Club of America, and is commissioned as major in Air Service Reserve Corps.

The duties of the Engineering Section are to design, devise and create improvements of all character in the planes, equipment and aviation facilities used by the Air Mail Service, for the safer, more effective and more economical operation of Air Mail planes. It draws up all specifications required by the Air Mail Service.

The Section is under the direct jurisdiction of the Bureau of the Second Assistant Postmaster General. It directs and supervises the installation of all improvements approved by the department on any field in the Air Mail Service. The office of this section is in New York City.

That the work of the Engineering Section is well under way is evident. It has already rearranged an Army training plane, using engines turned over by the Navy and developed a mail plane of very satisfactory performance. It has also accomplished a real revision of the system of feeding fuel to airplane engines and simplified this system, making it much more reliab'e and less dangerous. The design and details will soon be made public.

Data on the Design of Plywood for Aircraft

Report No. 84, National Advisory Committee for Aeronautics gives the results of investigations made by the Forest Products Laboratory of the U. S. Forest Service at Madison, Wisconsin, for the War and Navy Departments. Sufficient discussion on the mechanical and physical properties of plywood is included so that the data may be intelligently used. The data, although primarily intended for aircraft design, have a broader field of application.

First Pursuit Group Training

The course in Pursuit Low Bombing prescribed by the Chief of Air Service, has now been completed by the practice with Cooper fragmentation bombs. This course, which has been attended by so much unavoidable delay, was divided into three parts: class room work, dummy bomb dropping, and service bomb dropping. The first part ot the course was finished by June 30, 1920, so that there was ample time to complete the entire course by July 31, as required, had facilities for bomb dropping been available at the time.

Many obstacles had first to be overcome, however, before a single dummy bomb could be launched. The first of these was the fact that the only dummies available were not fitted with the proper means to attach them to the Cooper bomb racks provided. This obstacle was overcome by manufacturing bands to encircle the dummy bomb which was turned up into a flange, riveted at the base, and pierced for the bomb rack at the top.

After this bit had been accomplished, permission had to be obtained to drop some of the unloaded dummies somewhere on the Field which occasioned another, though shorter, delay.

Testing of the bombing equipment thus developed revealed two more serious obstacles. There were no bomb sights available and the target could not be seen through the wing in any event; also, no accuracy could be obtained by guessing at the proper time to launch the bomb after the target had disappeared under the leading edge. Then the bombs often struck the axle-fairing upon being launched, a mishap which would be very disastrous with Cooper bombs and not without its danger when using loaded dummies.

The first of these difficulties was overcome by cutting away the fabric of the fuselage section of the lower wing, making a large enough aperture to see the axle and a portion of the ground. The pilot could then sight on the leading or trailing edge of the axle-fairing, according to the position of his head, the height, wind velocity, etc.

The second and more dangerous obstacle was overcome by setting the bomb rack back about five inches. This was accomplished in the following manner:

The S. E. 5 Airplanes are fitted for Cooper Bomb Racks by means of four fittings attached to the bottom longerons. Since attaching the bomb rack to the holes resulted in having the bombs strike the undercarriage, and since it was not feasible to move the fittings back, two pieces of one-inch steel stock were drilled with four holes each, of the same size as those in the fittings, and were attached to the fittings by means of the foremost holes. The rearmost holes were bored five inches from the foremost holes, so that the bomb rack, when attached to the steel strip, would be five inches farther back than formerly.

After this new device was thoroughly tested, the practice in dummy bomb dropping was carried out. All pilots available for duty with the Squadrons and Group Staff completed the course, dropping eight instead of six, bombs each. During this practice, a total of 120 bombs were dropped and only a very few of these fell outside of the dispersion area of a Cooper bomb from the target.

This part of the course was completed by September 11, 1920, and it was proposed to run the Cooper bomb practice at Camp Stanley, about thirty miles north of Kelly Field. Inasmuch as there was a field of practice trenches adjacent to the Camp Travis airdrome, which would be available as a bombing range when not used by the Second Division Infantry, permission was requested and obtained from the Air Service Officer, Eighth Corps Area, and the Chief of Operations, Second Division to use this range, instead of the Camp Stanley range, which is in constant use by the 12th Field Artillery.

It was found that live Cooper bombs could not be issued and expended without permission of the Chief of Ordnance. This occasioned another delay while this permission was obtained. The date was then set for bombing and the bombs were drawn from the Ordnance Depot at Camp Stanley and transported under guard, with an officer in charge, to Kelly Field. The date was again set for the practice and tentative orders drawn up, but it was found that this schedule conflicted with that of the Chief of Operations, Second Division, so that the practice was again postponed until Tuesday, September 28, 1920, when it was finally carried out.

In that it would have involved considerable hazard to the innocent bystander, the bombs were not loaded on the planes at Kelly Field, but were transported under guard to the Camp Travis airdrome. The pilots then flew their ships over to the Camp Travis airdrome where their bomb racks were loaded. Since the course calls for three Cooper bombs per pilot, one dummy bomb was also placed in the bomb racks so that it could be launched first for a sighting shot.

Every possible precaution against accident was observed. Only one pilot was permitted to bomb at a time. Guards were stationed at all approaches to the range, and the bombs were charged with detonator and loaded on the racks under the supervision of an experienced officer.

It was planned to complete the work in one morning and no repetition of it is contemplated until the subject again comes up in the new tactical training course scheduled to commence on the first Monday in October. All available pilots participated, with the exception of two officers who were Post Officer of the Day, and Officer of the Guard, respectively. Only nine pilots were available with the squadrons and two on the Pursuit Group Staff, making eleven officers who completed this course. Thirty-three Cooper bombs and eleven loaded dummy bombs were dropped from an altitude of 500 feet. All of the sighting shots with dummy bombs were either over or short. All but seven of the Cooper bombs landed well within their effective dispersion area with respect to the target, thus scoring 26 hits—about 79 per cent accuracy.

According to our present schedule, this completes the Pursuit Low Bombing Course until the subject again comes up in future Tactical Training Courses.

Recently a new formation maneuver has been worked out and adopted by the First Pursuit Group. It is a variation of well known 180 degrees turn in which the leader executes a "half barrel," or "renversement," while the other members execute outside wing over turns. This turn, of course loses altitude. The leader executes an "Immelman," or corkscrew loop, while the other members of the formation execute steep climbing turns sometimes referred to as "chandels'." This turn makes a very pretty maneuver as well as a most useful one. It enables a patrol to quickly reverse direction in pursuit of an enemy without suffering a loss of altitude.

Cooperation of Airplanes and Searchlights

Major W. F. Tompkins writing in the *Military Engineer* on the cooperation of airplanes and searchlights in anti-aircraft defense, gives some general principles which are presented in substance here.

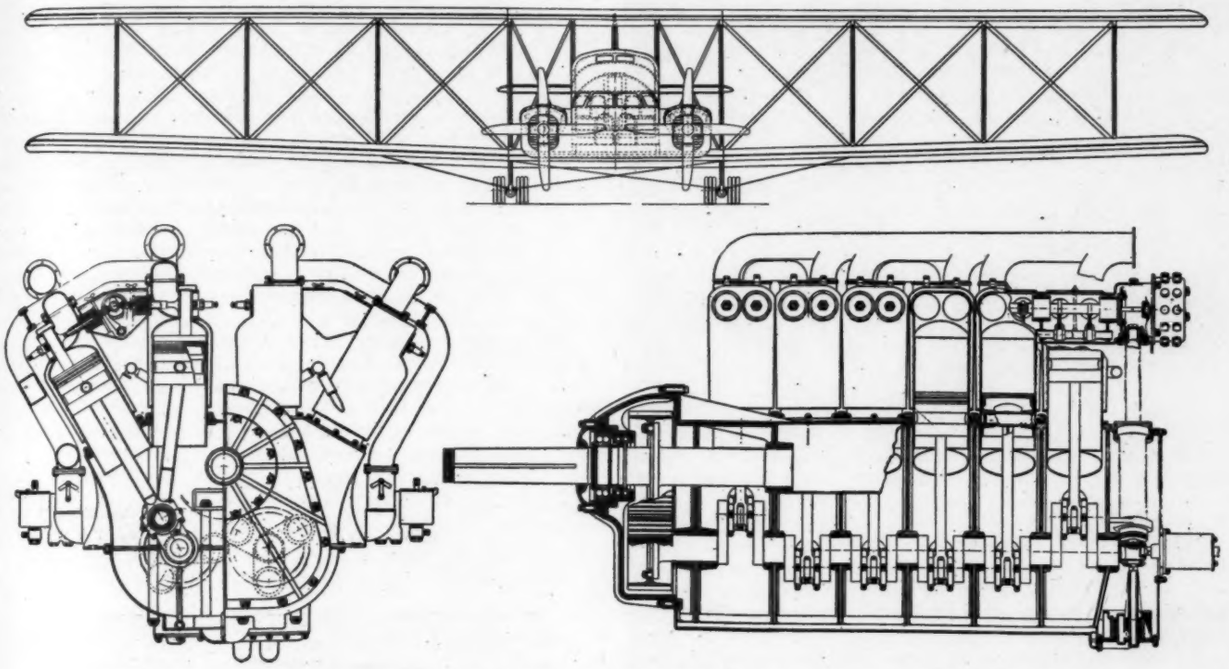
In the area to be defended there must be complete liaison between pursuit airplanes, anti-aircraft batteries and searchlights. Anti-aircraft guns must not fire over the territory allotted to defence by pursuit airplanes. The pursuit airplanes should fly at a suitable height to quickly attack any enemy airplane when illuminated; they should fly just in rear of the lighted area to prevent enemy listening posts from being aware of them, and to avoid hindering the work of the searchlight personnel. The aerodrome of the pursuit machines should be located behind the lighted area which is defended by them.

The searchlights should cover as great a length of front as is consistent with making the defences effective. Any excess of searchlight *materiel* after a continuous band of light has been placed across the front should be used to broaden the lighted area. The searchlights should illuminate enemy machines for a length of time sufficient to allow the pursuit machines to successfully attack them. The searchlight beams must not be exposed until the hostile plane is well into the lighted area.

The belief is expressed that, in the future, in view of the economy and efficiency of the method, the principal use of army searchlights will be in conjunction with pursuit machines as a defence against night bombers.

Proposed Transport Airplane

Every aviation prophet has predicted the coming of large transport machines in the near future but designers, in this country at least, have not taken them up seriously. The machine illustrated and briefly described herewith not only is designed by Raymond M. Howard, consulting aeronautical engineer, Detroit, Mich., to carry forty passengers with all their baggage but contains several interesting constructional features that are not as radical as they may seem at first sight. The use of metal construction, variable pitch propellers and supercharging are admitted to be the next steps in development.



FRONT ELEVATION OF THE TRANSPORT AIRPLANE AND SECTIONAL VIEWS OF THE ENGINE PROPOSED BY RAYMOND M. HOWARD

The problem of supplying sufficient power to drive a large airplane has brought out several different solutions. Owing to the limited power available in one unit, the majority of the giant airplanes built have been powered by a multiplicity of engines; in several machines as many as six have been used successfully. The two general types of construction are, a central power group and a distribution between the wings. The solution proposed here is the employment of very large power units placed very close together but driving the propellors directly.

This new transport machine is a biplane and is planned to carry forty passengers, a crew of four and about 2,400 lb. of freight. It is constructed of steel and aluminum and hence will not burn. It is equipped with two 1200 hp. dual V engines, designed especially for the purpose, driving 12 foot, four bladed, variable pitch propellers which are patnted by the designer.

The principal dimensions are as follows:

Span	125 ft.
Chord	16.5 ft.
Gap	14 ft.
Height overall	19 ft.
Length overall	75 ft.
Total area	3864 sq. ft.
Gas tank capacity	1200 gal.
Endurance	12 hr. at 100 m.p.h.
Maximum speed	130 m.p.h.
Power loading	15.4 lb. per hp.
Wing loading	9.6 lb. per sq. ft.
Total weight	18.5 tons

The engines are described as twin-twelves. The general construction can be seen from the assembly views. The cylinders are 6 by 8 in. and the total displacement is 5428 cubic inches. The weight is expected to be very low for the power. The arrangement of the valve gear is noteworthy. The starter is electric and the ignition is supplied by one generator.

The English Air Ministry Competition

The results of the government competition held on Martlesham Heath have been published as far as the awards are concerned. The full report of the judges has not yet been issued. The awards are not as high as intended and in one case there was no award.

The awards are as follows:

LARGE MACHINES

First Prize	No award
Second Prize—Handley-Page W-8	£8,000
Third Prize—Vickers Vimy-Commercial	£4,000

SMALL MACHINES

First Prize—Westland Limousine	£7,500
Second Prize—Sopwith Antelope	£3,000
Third Prize—Austin Kestrel	£1,500

The competition did not come up to specifications in many ways. It was intended to develop machines that were far ahead of present designs but many of the machines were only modifications of designs in use on airways at the present time. The judges have apparently considered this in making the awards.

The amphibian competition has brought out some very interesting designs but some of them were unfortunately finished too late to participate.

To Rebuild Anacostia Hangar

The Navy Department has decided to rebuild the hangar which recently burned down at the U. S. Naval Air Station, Anacostia. In spite of this disastrous fire which destroyed most of the planes, the station has continued operations.

Special Inclinometers and Indicators *

The function of inclinometers is stated in the pamphlet "Inclinometers for Aerial Navigation," where it is also pointed out that the bubble inclinometers in use have a limited value, because affected by accelerations of the airplane. Now, for certain purposes it is highly desirable to have an inclinometer which will be independent of the motions of the ship and at all times furnish a vertical line or horizontal plane of reference. The uses of such an inclinometer are as follows:

(1) In bombing and mapping by photography it will furnish a reference to the pilot for holding the airplane level;

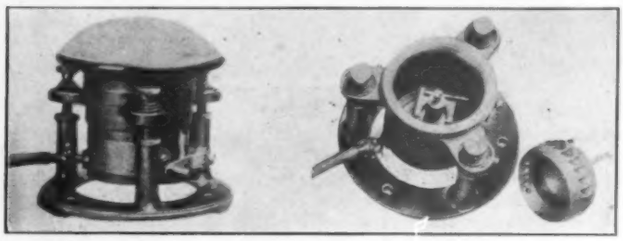


FIG. 1. TOUPIE GARNIER

(2) In cloud flying it will enable the pilot to keep the ship right side up and, to a limited degree, on a straight course;

(3) In navigation where the use of a sextant is necessary it will furnish a horizon.

While no such inclinometers have been adopted by the Air Service, a vast amount of experimental work has been done and some reference should be made of the more promising instruments. All of these have made some use of the gyroscopic principle.

The simplest gyro inclinometer is the French "Toupie Garnier." This is shown in Fig. 1. The rotor has a pivot on the lower side and a pointer on the top. The pivot rests in a jewel cup, and the center of gravity is below the point of support. The case in which the rotor is mounted is air-tight except for two small holes which direct air jets on the rotor, and a tube which is connected to a double Venturi. Air is drawn *out* by the action of the Venturi through the tube, and *in* through the two small holes so that jets of air are directed on the rotor and it is set to spinning. The glass cover is a cap of a spherical shell and has a scale, so that the inclination of the pointer is readily shown.

When the axis of spin is displaced from the vertical a torque is brought into play which produces a precession, which is opposed by the friction of the pivot. Thus the pendulosity in conjunction with the unavoidable friction serves to bring the spin axis to a vertical position. However, an error is produced by a horizontal acceleration of any sort, so that on a turn a precession at right angles to the radius of turn is set up which seriously displaces the gyro from the vertical, and it gets into circular oscillations which persist for some time after the turn.

In the French instrument a further error is introduced when the axis of spin is inclined to the axis of the case, due to the fact that the torque of the jets is no longer normal to the axis of spin. It was found that a rotor may be constructed without "buckets," which may be driven just as satisfactorily by skin friction, and with a broad enough spherical shell so that the air jets will not overshoot. This is some improvement over the original Toupie Garnier.

The Titterington inclinometer manufactured by the Sperry Gyroscope Co. is similar in principle to the Toupie Garnier. It is a long period gyro pendulum in which the rotor is the armature of a three-phase alternating current motor, the alternating current being supplied by a small fan generator carried on the airplane. The circular oscillations originating on turns are damped out by means of an air blast pumped by the rotor and directed by small vanes hung on an ordinary gravity pendulum.

A stabilizer developed by Dr. A. W. Duff and Lieut. W. A. Hyde for carrying a bomb sight, and very satisfactory for this purpose, may be used as an inclinometer. This is shown in Fig. 2. This is a short period gravity pendulum in which the oscillations are damped by air dashpots, the pistons of which are fastened to a neutral gyrostat. The pendulum part is mounted on gimbals so as to be free to move about two horizontal axes *aa* and *bb* at right angles to each other. The gyro is of the Sperry alternating current motor type. This is mounted at the top of the pendulum with the spin axis vertical, and on gimbals so there are two horizontal axes of rotation, $a'a'$ and $b'b'$, parallel to *aa* and *bb*, respectively. Four dashpots are fastened to the pendulum and the pistons to the case of the gyro by hinged joint. The axis of spinning gyro tends to remain fixed in space and furnishes a more or less stationary position for the dashpot pistons.

This gyro pendulum furnishes a very good stabilizer against short-period oscillations. But on long turns the steady torque applied through the dashpot gives a precession to gyro from which it is slow to recover.

To be used as an inclinometer the bomb-sight parts would be replaced by a bar and weight to serve as a pendulum and with a pointer attached to indicate on a scale fastened to the airplane the position of the airplane with reference to the pendulum, which will be to a greater or less degree stabilized in space.

Turn Indicators

The purpose of a turn indicator is somewhat analogous to that of an inclinometer, but more limited. As its name indicates, it is intended to show when a turn is being made.

As is pointed out in the pamphlet "Compasses for Aerial Navigation," a compass can not be trusted to show the process of a turn, especially on northerly courses. And since in flying in clouds or fogs, where there is no horizon or fixed object to guide the pilot, he can not know whether or not a gradual properly banked turn is being made, some additional instrument is necessary. The turn indicator furnishes all the additional information necessary, which is not furnished by the standard navigating instruments and through the senses of the pilot. It has been the experience of pilots who have used turn indicators in cloud flying that they are enabled to hold to straight courses, to turn off the old course to a new, and at all times to keep the airplane on level keel, which is quite opposite to the ordinary experience in cloud flying. A

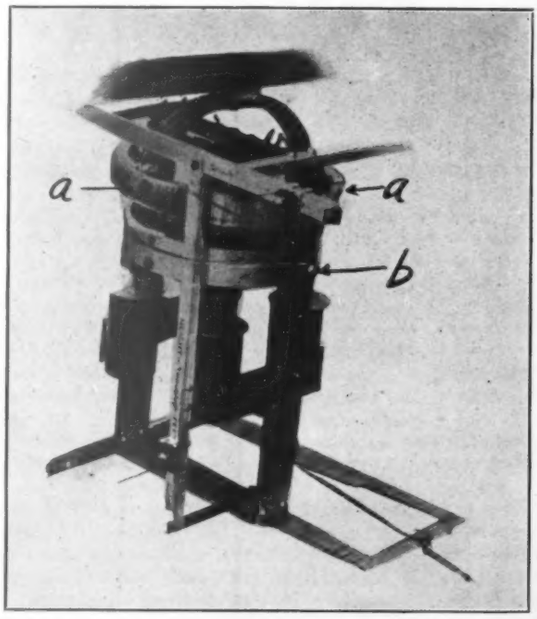


FIG. 2. DUFF-HYDE STABILIZER

* Prepared in the office of the Director of Air Service.

turn indicator that is reliable is a much needed instrument on bombing airplanes, and all airplanes, military or otherwise, which are used for long flights that must take place in all kinds of weather. The need of the instrument will increase as aircraft of long-range activities are developed.

Two types of successful turn indicators have been developed the "static head" and "gyrostatic."

The former turn indicator has been used considerably by the British. From an indicator on the instrument board two lines of tubing of about one-fourth inch inside diameter run out toward the wing tips, one on the right and one on the left. The outer end of each tube ends in a "static head" similar to the static head of the R.A.F. Pitot tube, Mark IV-A. The forward end of this is closed by a bullet nose and there are a number of fine holes drilled through the side of the tube about 2 in. back of the nose.

Now, on a turn the centrifugal force acting on the air in the tubing on the outer wing is greater than the centrifugal force on the air in the tubing on the inner wing. Consequently more air is forced out through the static head on the outer wing and the pressure in the tubing on that side is less than the pressure on the inner, and this differential pressure causes the pointer on the indicator to move.

The indicator used is the Ogilvie balloon air-speed indicator, with a specially marked dial, which is capable of showing a very small pressure difference. It was found that the static heads must be mounted exactly parallel to each other and parallel to the line of flight in order to operate correctly. It is better to have the heads mounted on swivels with vanes so that automatically they take the direction of line of flight. When mounted on the outer struts this indicator shows a side slip in a straight line as a turn in the direction of the slip. This error is removed when the static heads are mounted 2 ft. above and 1 ft. in advance of the upper wing. This is not a practical place of mounting, but this difficulty is of no consequence if known and understood, for the pilot can always distinguish a side slip from a turn by the side wind. This type of turn indicator will detect a turn at the rate of 2 deg. per minute.

The gyrostatic turn indicator is a much simpler and more rugged type. It was developed by the Science and Research Department, and a similar instrument is being manufactured by the Sperry Gyroscope Co. This is illustrated in Fig. 3. The mechanism of the indicator is shown at *B*, which is enclosed in the case *C*. The gyro *a* is mounted on a horizontal axis in a gimbal *b*, which in turn is mounted on the frame. The pointer is mounted on the shaft *e* of the gimbal. The axis of spin is athwartship and the direction of spin such that upper rim moves toward the nose of the airplane. The axis of the gimbal *b* is parallel to the longitudinal axis of the airplane. The gyro is driven by air jets from the nozzles *d*. The case is airtight except for an outlet tube at the back, which is connected to the double Venturi *A*, which is mounted in the slip stream. As the air is drawn out of the case new air is forced in by atmospheric pressure through the inlet tubes *c* from which the nozzles open.

The hairspring *f* tends to keep the axis of spin horizontal. If the ship turns to the right a torque is exerted which turns the right end of the spin axis *up*. This torque is opposed by

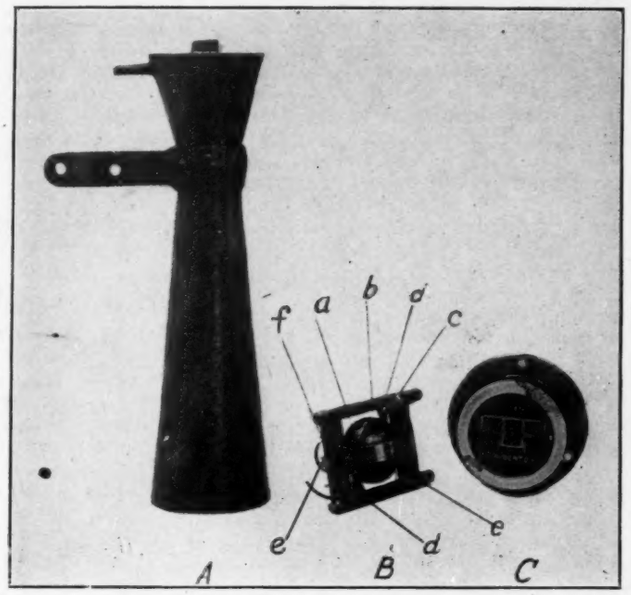
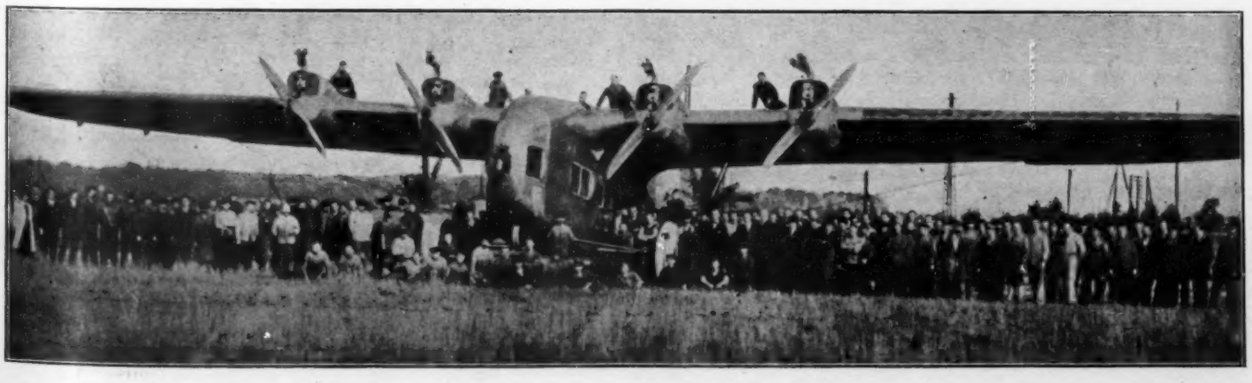


FIG. 3. GYRO TURN INDICATOR

the hairspring, and as soon as the turning of the ship stops the action of the hairspring brings the gyro back to the zero position. When the turn is to the left the spin axis is tipped in the opposite direction. The torque acting on the spin axis is proportional to the rate of turn of the airplane, whether the turn is properly banked or skidded, so the instrument shows both properly banked turns and skidded turns. Since the tipping of the spin axis of the gyro is opposite to the bank of the ship on a turn, the instrument is very sensitive. If the airplane is banked over without turn, as in a side slip, the indicator is not effected. However, since the ship is generally turned slightly on going into a side slip the turn indicator at first shows a turn and then comes to a zero position as the ship comes to a straight line side slip.

This turn indicator has been thoroughly tested first in flights in clear weather and then by flights in clouds. It is found to be reliable and satisfactory in every particular.

The Zeppelin Four-Engined Airplane



GIANT ZEPPELIN AIRPLANE BUILT OF METAL. IT CARRIES EIGHTEEN PASSENGERS IN ADDITION TO ITS CREW OF FOUR

Photo International

Air Mail Extension

By Major C. C. Turner

Stepping down from an airplane after a flight at Cricklewood yesterday and seeing two big Handley Pages arrive from Paris and disgorge their passengers and freight, it came to one irresistibly that an advantage of the airplane over the train and the boat is that its carrying capacity may be comparatively small, and that this is anything but the unmitigated drawback it is often represented. At present there is only a day service to Paris by rail and boat (if we except the long Southampton-Havre route), and the traveller's convenience has to conform to a very limited time-table. Now, the tendency of the day in transport-engineering is towards smaller units and more of them, and the airplane is a particularly good expression of that tendency. For there is no reason at all why there should not be an almost continuous service of airplanes—say four per hour, or even more frequently—on so important an air line as the London-Paris. That it will come to something like this is absolutely certain. Even at present prices, and with an organization that although good is imperfect, the business is increasing: more lines are being established, and already the capitals of Europe are linked up with each other and with extensions even to Morocco. A Copenhagen-London service has started, and Scandinavia and Berlin are aerially linked up with London. If the volume of traffic justified the employment of a very much larger number of machines, moreover, traffic by night as well as by day could be conducted for this only means signalling and lighting contrivances and personnel; the mechanical difficulties were solved long since, and the experience necessary has been obtained. And when that is done the one advantage of the railway to Scotland, in that it carries us and the mails by night when our airplanes are idle, will have disappeared.

It is to be noted that important extensions of the regular air services are being made at the fall of the year, when the weather is unfavorable, and the decrease of daylight appears to make them difficult. At Cricklewood, which is one of London's two air termini, the reason for this is obvious. Already the airplane is displaying almost as much indifference to bad weather as the railway train and the cross-Channel boat. And in one respect it scores over the latter, for with boisterous winds from the southwest and a rough Channel crossing in prospect, even seasoned travellers appreciate the advantages of a method which protects them from the terrors of *mal-de-mer* and at the same time saves precious hours and much irritation of detrainment and embarkation. So with the break-up of the weather there is no decline in the London-Paris air traffic; indeed, the reverse is to be noted.

Holland and Back in a Day

Air travel in rain and with poor visibility is a curious experience. There has been a good deal of it of late. From the comfortable cabin of a Handley Page one looks down on wet roofs and the tops of umbrellas, the latter tiny black discs without visible means of propulsion, and reflects upon the enormous difference between aviation of today and that of pre-war times, when, exposed to the fierce rush of air, and often spattered with oil, one only went up in fine weather. Few Londoners realize on such rainy and windy days as we have lately had that the London-Paris air services have been carried on as usual. It would be absurd to claim that the airman likes bad weather, but it is a fact that at Cricklewood work goes forward, and everybody is quite cheerful in spite of it. The evenings are "drawing in," but beyond a slight adjustment of the starting-time this has made no difference to the services. And what a small matter it is will be seen from the fact that one day this week a pilot brought a machine from Amsterdam to Cricklewood in the morning, drove into town for luncheon, and then went back to the aerodrome and that afternoon took another machine back to Amsterdam. Ten and a half hours saw him twice in the Dutch and once in the English capital; a very remarkable record, when you come to think about it. And speeds are becoming greater, airplanes more and more reliable, and the organization better, and with even greater possibilites.

As to the recent records, many of them have been made on machines that would not be given the British Air Ministry certificate of airworthiness. And actually the Federation at its recent meeting took official notice of the aviator who looped the loop 962 times in about four hours, and I am not sure that it has not put this performance among the world records! Surely this is scarcely worthy of a great International body, and would not be, even though the body were solely concerned with the encouragement of sporting flying. The International Federation is more than that. But in fairness let it not be overlooked that at the same meeting, for the first time, records in the carrying of a big, useful load, and duration of flight with that load, were granted—in each case to the Handley Page W.8, the machine that came out on top in the Air Ministry tests. So even the Federation is beginning to see that there is a commercial side to aviation.—*Daily Telegraph.*

Naval Air Service Training Carrier Pigeons

The U. S. Naval Air Station, Anacostia, D. C., has become one of the most important carrier pigeon posts in the United States. Pigeons for the communication service for the United States Navy, are reared and trained at this capital city station. The birds are entered in most of the important trials and races conducted by carrier pigeon fanciers in this section of the country. On the first of October, twenty young birds were entered in the final race of the National Concourse Association from Cameron, Va., to Washington. In this race a Navy bird took fourth place. On October 10, five birds were liberated at Mount Vernon, Ohio, a distance of 300 miles from the Anacostia Station. These birds were flying in the Inter-City championship flight. Three of the Anacostia birds homed on the same day of toss and the other two the next day. The first three birds to home made a flying speed of more than 65 ft. per sec. Two birds were entered at the Pigeon Fanciers Convention at Pittsburgh, Pa., on October 15. These birds covered a distance of 260 miles in excellent time.

Evansville, Ill., to Have Air Deliveries

The first air route to carry parcels from Evansville, Ill., to surrounding towns will be established soon.

Lieut. Charles Hardin, former army aviator, will establish the route. He is now working out details of a plan for regular deliveries. Suitable landing fields will be sought at each town in the vicinity of Evansville.

No weight or bulk limits for parcels has been worked out as yet. The rates are still to be worked out also.

Lieut. Hardin also plans to start an aviation school within the next month if the city and surrounding towns show sufficient interest. A Curtiss company representative, Mr. Broderick was at Evansville consulting with Mr. Hardin regarding how many planes will be needed.

Lieut. Nelson of Cleveland, Ohio, an ex-officer of the army, has been employed by Hardin. One Curtiss plane is now at Hurst field and will carry passengers.

Airplanes to Carry Salmon Eggs

Employment of airplanes to transport salmon eggs to the upper reaches of the Fraser River, British Columbia, is the suggestion of the Superintendent of Fisheries. Hitherto it his been found impossible to restock the celebrated Fraser River fishing grounds from hatcheries situated away up the stream, as the fertile eggs will not stand the carriage by pack animals over the mountain trails. The transportation by air would, it is believed, solve this problem.

Fokker Studying the American Situation

Anthony H. G. Fokker reached New York last week and is now making visits to all the principal points of aeronautical interest in this country. Mr. Fokker as everyone knows is a Hollander who in 1910 at the age of twenty went to Germany and built and flew his first plane. He has been building and flying airplanes in Germany ever since. During the war his creations were the terrors of the skies to all the aviators of the Allies.

After the armistice, Fokker established himself in Holland and is building all types of airplanes at Amsterdam. On his arrival the following statement was given out.

"I was never in the German Army or in the Service of the German government. I visited the front several times to make flying experiments with my new machines and to study war conditions, armament, etc. The Germans gave me *carte blanche* to spend money. I invented the system of shooting through the propeller, and that gave the Germans a tremendous advantage over the Allies until the latter began to shot through their propellers also. My invention of shooting through the floor of the fuselage also proved a surprise and was deadly until the Allies followed suit.

"Although I had my business in Germany during the war, I did *not* accept German nationality and never lost my Dutch nationality. I have recently equipped the Dutch Air Force with new machines. I am still improving my war machines and bringing out inventions for military purposes. I am of course always prepared to build airplanes embodying my latest ideas for any government which requires them.

"My latest machines for civilian, passenger, mail and freight services have proved equally successful and now are in daily use on some of the air lines between London and the continent. Next year the entire air mail service between London, Brussels, Amsterdam, Hamburg, Copenhagen and Berlin will be carried out with the big Fokker monoplanes.

"Air transport will have to be made a paying proposition by the use of new types of machines. The type of ship built during the war, and after in many cases, is of no use for commercial purposes. They do not carry enough load proportionate to their running costs. Machines will become simpler, stronger and cheaper. Special engines will also have to be made.

"Individuals will soon wish to have airplanes as they now have automobiles. For this two things will be necessary: First, the provision of sufficient flying fields, with equipment, near the center of towns, so that the use of an airplane will be an undoubted saving of time. Second, we shall have to make machines which will ascend from a very small space, such as a roof. For this the development of a light engine will be necessary, an engine not weighing two pounds per horsepower but half a pound. Such an engine would solve all our problems.

"I am more than ever convinced that in anything between five and ten years we shall cross the ocean in less than a day as safely in giant airplanes as we do now in liners, and more comfortably. Wind and bad weather already do not trouble us in the air, flying with certainty in fog will be made easy by the development of directional wireless and our airplanes will find their port by its means like lines do now by their submarine signals.

"I believe the use of aluminum alloys and steel will increase in the construction of aircraft, but I think these materials have been used indiscriminately and excessively in the all metal machines of which so much has been heard recently. Accidents have been caused by the use of these metals for important parts of machines, although their properties and behavior in use are insufficiently known. Also the amount of difficult hand-work in this sort of construction is too expensive if properly done and very dangerous otherwise, and in other parts of the world where there is plenty of water and no landgrounds, seaplanes will be the right thing, but for long distance work, even transoceanic, the land going machine will be used.

"Frankly, I am out for business all over the world. Air transport is of the most international importance and its possibilities have to be studied everywhere. I have my eye not only on the requirements for transcontinental traffic, but even on the question of a transatlantic service."

ANTHONY H. G. FOKKER

Accompanying Mr. Fokker are his wife and his chief engineer, Robert B. C. Hoorduyn. The latter was in England during the war engaged in the construction of British aircraft. Mr. Fokker seeks a market in the United States for his planes and inventions which are numerous. He is also anxious to look over American airplanes and compare them with European types.

Giant Airship Industry

German airship authorities are convinced of the future international commercial possibilities of giant airships and are making every effort to save as many as possible for German use. Some members of the Inter-Allied Air Commission were said to favor establishment in Germany of a few stations for the use of international aircraft. Commercial airship interests in France and Great Britain, however, were described as anxious to delay for several years the recovery of the giant airship industry in Germany.

Situation in Naval Aviation

A strict censorship has been clamped on the activities of naval aviation, or rather the officers on aviation duty in the Navy Department have been directed not to talk for publication on aviation matters. The orders are to the effect that any matter of information requested by the press shall be submitted for approval to the Chief of Naval Operations and when approved released through the Navy news bureau. The reason for this order, it is learned, was the publication of an item relative to radio direction of aviation bombs. The publication was not due to the disclosure of the information by any officer on duty in the Navy Department, but to the fact that news of experiments was given by a civilian as far removed from the Navy Department as the state of Ohio, and its publication made possible by an association of civilian manufacturers. It is considered likely, when the facts concerning these items of confidential information are checked up in the Navy Department, that the silence ban may be lifted; but when that will be is not indicated at present. Until such time as the Chief of Operations rescinds his order, therefore, Navy aviation activities so far as they are confirmed officially may see the light of print only in such formal and routine statements as are to be "released" to the press. Officers on aviation duty, likewise, may be permitted to receive representatives of the press; but as stated by a high ranking officer on this duty, "we cannot tell them anything."

The effect of the silence order has naturally been to arouse a feeling of resentment that officers should be regarded as so lacking in judgment or loyalty to the Service as to be under suspicion of disclosing confidential matters. On the other hand, they know that in aviation the Navy is accomplishing many things of very deep interest to the Services and that the publication of news of aviation activites could not do aught else than to justify to the country the large expenditures in this highly specialized effort in the Navy. Naval aviation, though it has been checked by reason of the failure of Congress to pass the Hicks bill creating a Bureau of Aeronautics and a Naval Air Corps in the Navy Department, has been making great strides since the passage of the Naval Appropriation act. In both heavier-than-air and lighter-than-air craft, it can be said, the advance has been greater than in any other country with the possible exception of Germany. But under the silence order information of interest on this advance will not be disseminated except for such routine statements as may be issued and which, as a rule, have had extracted from them the very detail that would make the items of interest.

For more than a year naval aviation has been under direction of an assistant to the Chief of Naval Aviation, who has been little more than liaison officer with the bureaus, for there are assistants for aviation in the Bureaus of Ordnance, Navigation, Engineering, Yards and Docks, Supplies and Accounts, Construction and Repair, Medicine and Surgery. Likewise, schools, stations and depots for naval aviation are under direction of the commandants of naval districts, and fleet aviation under the commander of the Fleet Aviation Detachment, under orders of the commander-in-chief of the fleet. During the war there was an Aviation Division in the Navy Department which functioned to all intents and purposes as a separate bureau, and the fact that there is a bill before Congress to create a separate bureau and corps for aviation is an indication that the existing method of administration and control is considered unsatisfactory. Senator Keyes, of the Senate Committee on Naval Affairs, and Representative Hicks, of the House Committee on Naval Affairs, stated just before Congress adjourned in June that they intended to bring the bill before the short session opening in December, and both were confident that it would be enacted into law. The admitted importance of aviation in its relation to the fleet is of itself a promise of a clarificaton of the situation in the not distant future. With a Bureau of Aeronautics and an Air Corps established, dissatisfaction would disappear and the aggressive, progressive and capable officers of the Navy connected with aviation will come into their own —and that long before the proposal of a single Air Service can gain a foothold, if the opposition the project met on the floor of the Senate early this year is an indication of the legislative attitude toward such an enterprise.—*Army & Navy Journal*

Alcogas Aviation Fuel and Export Aviation Gasoline

Aviation alcogas, prepared by the Industrial Alcohol Co., Baltimore, Md., for trial by the Navy Department and by the latter submitted to the Bureau of Standards for test, was a mixture apparently of about 40 per cent alcohol, 35 per cent gasoline, 17 per cent benzol, and 8 per cent other ingredients. This is not the alcogas prepared for commercial or passenger car use. The exact composition and methods of manufacture are a trade secret.

The tests made for the Navy Department consisted in a direct comparison, in a 12-cylinder Liberty engine, between alcogas and standard "X" (export grade) aviation gasoline with respect to maximum power attainable, and fuel consumption with the leanest mixture giving maximum power. The tests were made in the altitude laboratory at the Bureau of Standards, where controlled conditions simulate those of any altitude up to 30,000 ft. The speed range covered was from 1,400 to 1,800 revolutions per minute and the altitude range from ground level to 25,000 ft. Two series of comparisons were made, one with 5.6 compression ratio pistons and one with 7.2 compression ratio pistons.

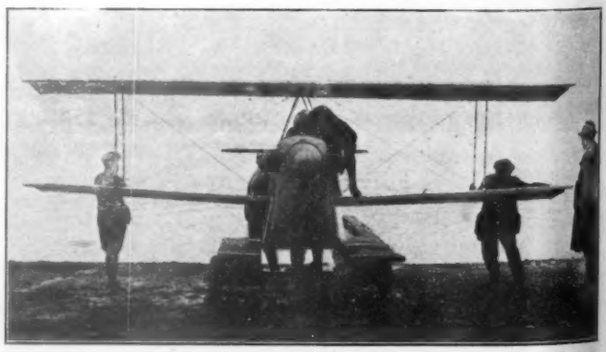
A copy of Report No. 89 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

DeHaviland Aircraft Co. Formed

Capt. Geoffrey deHaviland, the designer of the original DH-4 and formerly chief designer of the Airco, has formed the DeHaviland Aircraft Co. The present purpose of the company is to start in with the care and maintenance of present designs and later produce machines of their own construction. The directors are Capt. deHaviland, A. E. Turner and C. C. Walker all former members of the Airco staff.

It is reported that Capt. deHaviland and Mr. Walker have been working on a six-seater cantilever monoplane to be fitted with a 240 hp. engine.

The formation of this concern marks the re-entry of some of the best blood in the old Airco, into active participation in commercial aviation. This is a hopeful sign, for the members of this new concern are intimately connected with the progress of events and would not have made such a step had they not believed that sufficient business could be found soon enough to make the firm a success.



THE MACCHI 16, WINNER OF THE CONTEST FOR SMALL MACHINES HELD IN MILAN BY THE AERIAL LEAGUES OF ITALY

Air Mail in Haiti

The Marine Aviation Force stationed at Santo Domingo City, D. R., is developing air passenger and mail service with highly satisfactory results. Passengers are being taken from one post to another and mail is being delivered whenever a suitable occasion arises. A satisfactory mail service is in effect between Santo Domingo City and Santiago. Also between Santo Domingo City and San Pedro de Macoris.

The mountainous and jungle covered conditions of many portions of the Island of Haiti, render mail service by air much quicker than by any other means. Furthermore, the unsettled condition of portions of the interior, is a source of delay to transportation upon land. It appears that airplane mail will be the solution of the problem of delays in communication which have been experienced for a long time in Haiti.

New Speed Record

A new world speed record over one kilometer was made November 4 at the Buc Aerodrome, near Paris, by Bernard de Romanet, with a Spad-Hispano machine, according to the *New York Times*. The official speed, controlled by chronometers and officials of the Aero Club over a measured kilometer, was 309 kilometers, 12 meters per hour (about 193 miles), the distance being covered in 11 65-100 seconds.

This record beats the one made by Sadi Lecointe on Oct. 20, when he passed the 300 kilometer per hour mark for the first time.

During one of his journeys over a measuered distance which was unofficially timed de Romanet beat his official record by a big margin. This speed was timed at 11 1-5 seconds, giving an average of 321 kilometers, 428 meters per hour.

When the record was made there was considerable mist, which de Romanet declared afterward somewhat bothered him.

Since he flew in the Gordon Bennett race he has modified his machine and now sits entirely hidden in the fuselage, with only lateral vision.

Bombing Tests on the Indiana

The bombing experiments using the old battleship *Indiana* to determine the effect on the vessel of aerial bombs exploded under water near the vessel have been completed. Aerial bombs which had been placed at a carefully measured distance under water from the hull of the vessel were exploded and produced the expected damage to the vessel's plating. Upon completion of the under water experiments with bombs the vessel was taken into shoal water. The bombs were not dropped from the air.

Further experiments to determine the damage which may be expected from bombs exploded on the ship will be conducted.

Tangier Island Has Airplanes

According to the New York *World*, inhabitants of Tangier Island, Va. are awaking to the requirements of the times. They have just purchased five fast seaplanes from a representative of the Marine Air Transportation and Manufacturing Co. Acquisition of so many planes by a community of only 1,200 inhabitants must seem extraordinary when it is disclosed that there is neither an automobile nor a carriage of any kind there.

MAJOR R. W. SCHROEDER WHO HAS BEEN HONORABLY DISCHARGED FROM THE ARMY AND IS NOW WITH THE REPUBLIC FLOWMETER OF CHICAGO

The island's main street is only eight feet wide. Most of the traffic is handled in wheelbarrows.

Many of the older residents have never left its shores. Automobiles, steam cars and trolleys are unknown to them. There is but one physician there and the seaplanes will be used among other purposes to procure outside medical help in case of emergency. Their other uses will be to transport critically ill or injured persons to Crisfield Hospital for treatment, and as an aid to net fishing.

The planes will also be used commercially. That the residents will not tolerate inquisitive interference in their affairs was manifested a short time ago when a moving picture operator was driven away and his machine smashed when he attempted to take pictures. The operator's visit followed the Nation-wide publicity of the shooting of a seventeen-year-old boy by the island constable for violation of a Sunday ordinance.

Regular Air Service to Big Bear Lake

The *Fly Leaf*, Oct. 9, is authority for the following report of a commercial enterprise soon to be put into operation in Southern California.

Preparations for a regular aerial service to Bear Valley, to be operated both summer and winter, are being made by the Bluebird Aviation Company, under the direction of D. D. France, according to George B. Harrison, Secretary of the Aero Club of Southern California.

The tentative plans call for the use of Standard planes equipped with Hall-Scott L-6 motors. A landing field will be used at Ontario as a fueling point between Los Angeles and the valley.

For winter service, when Big Bear Lake is covered with ice and snow, it is said that planes are to be equipped with snow skids, similar to those commonly used on sleds.

Quarantine Regulations for Aircraft

The U. S. Public Health Service has issued the amended regulations applying to aircraft flying between the United States and any foreign port.

The provision relating to bills of health is as follows:

"Masters of vessels or aircraft clearing from or leaving any foreign port or any port in the possessions or other dependencies of the United States for a port in the United States or its possessions or other dependencies must obtain a bill of health, in duplicate, signed by the proper officer or officers of the United States as provided for by the law, except as provided for in paragraph 3."

Exemptions are made in the case of aircraft plying between Canadian ports on the St. Croix River, the St. Lawrence River, the Niagara River, the Detroit River, the St. Clair River and the St. Mary's River and adjacent ports of the United States on the same waters; also aircraft plying between Canadian ports on the following lakes: Ontario, Erie, St. Clair, Huron, Superior, Rainy Lake, Lake of the Woods, Lake Champlain and ports of the United States; also aircraft flying between British Columbia and ports on the Pacific coast; also aircraft flying between Canadian ports on the Atlantic Coast and ports of the United States on the Atlantic Coast as far south (inclusive) as Boston; also aircraft flying between Mexican ports on the Rio Grande River and cities of the United States on the same river.

"47. The form of certificate which shall be issued to a vessel or aircraft when released from quarantine shall be prescribed by the Surgeon General of the Public Health Service, and shall embody the statement that the vessel or aircraft has in all respects complied with the quarantine regulations prescribed by the Secretary of the Treasury, and that in the opinion of the quarantine officer it will not convey quarantinable disease, and that said vessel or aircraft is granted free or provisional pratique to enter her port of destination, the name of which is to be embodied in the blank."

The pilots of aircraft must obtain a bill of health from the American Consulate, and upon arrival at a port of the United States, he is required to obtain clearance paper from the quarantine officer.

Detroit to Have Second Airport

The city of Detroit, determined to maintain its lead as a progressive aeronautical center, intends establishing its second municipal landing field. At the request of the commissioner of parks and boulevards, the commanding officer of Selfridge Field, Captain N. J. Boots, flew over the proposed site and after making an additional ground inspection will recommend its establishment at the next meeting of the city council.

The field will only permit one way landings to be made, but in the event of a strong south wind the other municipal field, located several miles away, will be available. The new field is situated along the Detroit river, very close to the heart of the city, and its water frontage makes it peculiarly adaptable for use by seaplanes.

The commanding officer has conferred with the officials of the city of Detroit relative to the framing of an ordinance governing flying over that city. The opinions of the chief of air service in this matter were given and the city authorities agreed that legislation governing aerial traffic should be enacted by the federal government in order that such regulations will be universal throughout the country. They realize that haphazard legislation by separate municipalties will only result in a confusing tangle of laws.

La Crosse to Have Hangar

The city of La Crosse, Wis., will not be required to build an elaborate and expensive hangar to house mail airplanes on Salzer field, according to information given local officials by aerial mail service authorities. Postmaster O. R. Skaar has been notified that a long shed, with facilities for taking care of two or three airplanes, will meet the demands of the post-office department.

La Crosse is the only stop the mail planes make between the Twin cities and Chicago.

Stout Bat-Wing Tested

The first "bat-wing" monoplane, designed and built in Detroit by William B. Stout and intended for use as a three-passenger aerial limousine, underwent its first test at Packard field recently. Bert Acosta, the noted pilot, who had been brought on from the east in the morning to make the trial, entered the door of the new limousine "ship" soon after 3 o'clock. His instructions were to "taxi" around the field to see if the "bat-wing" would navigate on her own power—something she had never been asked to do before.

Acosta started off and taxied straight ahead for 50 feet. Then, ignoring his instructions not to leave the ground, he soared straight into the air away across the country, out of sight and back again, while Mr. Stout and his friends watching the trial trembled for his safe return. But return he did after a 20-minute flight in which the monoplane showed all the qualities that had been claimed for her.

"Never in all my experience," said Mr. Stout after Acosta had landed, "have I seen an untried plane perform like this one. The fact that she was able to take the air on her first time out, without preliminary ground trials, is remarkable and marks an epoch in aerial transportation."

The Stout bat-wing is the new type of all-veneered, internally-trussed monoplane, which is expected to displace the military type developed during the war. It is equipped with a Packard 200 horsepower airplane engine.

It is said that later types of the bat-wing will be perfected so that they will give from 10 to 12 miles on a single gallon of gasoline, or about the same as an eight-cylinder automobile uses.

Minnesota Air Squadron to Build Plane

A complete airplane will be constructed by the engineering class of the Minnesota observation squadron during the coming winter months, according to an announcement made by Lieut. Col. W. C. Garis, in the office of W. F. Rhinow, adjutant general.

The engineering class comprises 30 men and will be under command of Lieut. B. L. Newgard, St. Paul. Classes will open November 1 evening at the Curtiss airplane field, St. Paul.

All material will be furnished by the Curtiss-Northwest Airplane company and when the machine is completed it will be given to that company.

This, according to Colonel Garis, is the first attempt of any department, either by national or state guards, to build an airplane. It is expected to have the machine completed in time for spring flying.

Air Service Units of R.O.T.C.

The Chief of Air Service has been authorized to take the necessary preliminary steps with a view to organizing five Air Service units of the R.O.T.C. at selected colleges during the academic year 1920-21. A table of equipment for both lighter and heavier-than-air units will shortly be published. A minimum enrollment of 100 students will be required and transfer of students now enrolled in existing units at the instutions selected will be permitted both for the basic course students and students in the first year of the advanced course, with the consent of the student and the approval of the authorities at such institution, without reducing the existing units below the minimum enrollment required for ther maintenance.

Course for New Air Officers

The officers appointed in the Army Air Service include a large number of pilots of varying experience and flying qualifications. Commanding officers have been directed to carefully examine these qualifications, experience and ability, and recommend the necessary training in each case as will qualify the officer for the duty he should perform. If in the opinion of a commanding officer a reasonable number of flights with an experienced pilot will bring the new pilot back to proper flying form, the latter will be given such a course; but if a "refresher" course is advisable, the new officer will be sent to pilot school for the complete course.

SIX THOUSAND TIMES SUCCESSFUL IN HUMANITY'S CAUSE

OUT of the maze of war-work, through that smashing terrible strain of production, comes a proud record of achievement.

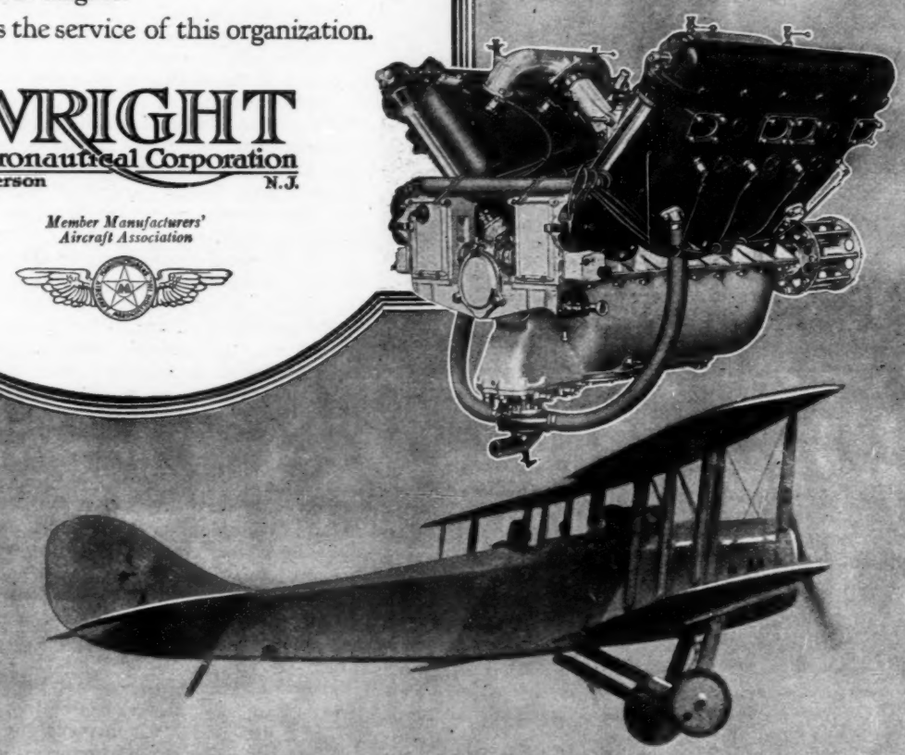
Not one failure in the building of over six thousand Wright Aeronautical Engines! Not one rejection of our product in either the government-supervised inspection records in our possession or in the archives of the War Department.

Such is the performance of the Wright Aeronautical Engine.

Such is the service of this organization.

WRIGHT
Aeronautical Corporation
Paterson N.J.

Member Manufacturers' Aircraft Association



Orenco Touring
Powered with Model K Wright Aeronautical Engine

WRIGHT
AERONAUTICAL ENGINE

STANDARD MOTOR POWER FOR AIRPLANES, FLYING BOATS, SEAPLANES

Chief of Italian Army Air Service

Major General Roberto De Siebert is the new chief of the Italian Army Air Service. Since July, 1920, all the Aerial Services have been taken up by the War Department, so

MAJ. GEN. ROBERTO DE SIEBERT

that General De Siebert not only directs the Military Aviation but also the Commercial Aeronautics.

General De Siebert is one of the youngest and most clever officers of the Italian Army. During the entire war he was at the Italian Front, in the Engineer Corps. Since the Armistice he organized the Army Air Service and now he plays a most important part in the Italian aeronautics.

Typhoon at Fort Mills, P. I.

The most severe typhoon in the history of the Philippines for fifteen years passed over Fort Mills on the afternoon of October 19. From all indications and lack of all warnings it must have formed quickly and the damage to several organizations was enormous. Tile roofs of the buildings in the artillery garrison which have withstood typhoons for many seasons were blown away like chaff; trees were uprooted and stripped of branches and leaves; trucks and other motor vehicles were picked up and removed from roads to embankments and ditches in the vicinity; a scout soldier on outpost duty was blown off of a one-hundred foot cliff into the bay where he was given up as lost, but at roll call the next morning he was present and none the worse for his experience; barges and lighters loaded with Quartermaster and Air Service supplies were blown a distance of fifteen miles and piled up on the shore of the bay.

The worst damage of all was incurred by the Air Service on the "Tail-of-the-Island" where the new site is being established and under construction. It was here that the 17th and 27th Balloon Companies were quartered in tents that happened to be directly in the path of the storm. Within half an hour after the storm broke, there was no camp, the tents being ripped to shreds. The Air Service post exchange was shattered, and pieces of it scattered over an area of five hundred yards. One man who happened to be in this building at the time suffered a broken leg and minor injuries.

The storm had its humorous side as well as its destructive, as is shown by the fact that when the balloon camps were demolished, the cook-shack and subsistance store room went along, thus the chances for chow until the storm subsided were nil. When the post exchange went down there was a wild scramble among the boys to save for themselves some of the stock, and instead of getting all the canned meats, fish, cakes, etc. that would have stood them in good stead until a field kitchen could be acquired, nothing but pop, chewing-gum, candy, playing-cards, fountain-pens and the cash register were saved.

Luckily no damage to seaplanes or airplane equipment was sustained that would impair operations.

Aviators' Dinner at Hotel Astor

The Aviators' Dinner held at the Hotel Astor on Armistice night was a great success. The dinner committee was most efficient in its preparations for the guests. Chas. W. Kerwood was chairman and Cole J. Younger was treasurer. Others on the committee were Eddie Rickenbacker, James B. Taylor, Jr., Comdr. A. C. Read, Elliott Springs, Charles Hanson Towne, Harold E. Hartney, F. H. La Guardia, Morris J. Connolly, Dr. S. G. Gant, Chas. J. Biddle, Douglas Campbell and Summer Sewall.

There was no speaking by guests but there was impromptu entertainment by many of those present. The *Evening Post* account of the dinner is so cleverly written that it is worthy of reproducing:

Food was a mere incident at the dinner of 800 aviators, former Army and Navy service pilots, who celebrated Armistice Day in their own way at the Hotel Astor. Food was brought and taken away and doubtless some people ate it, but there was more serious business on hand. There was no formal speaking, no one got up to tell after dinner stories while listeners drooped under the waning influence of their coffee. There was none of this sort of thing going on. It was rather energy, action and life.

There was no formal "we have with us tonight." There wasn't even a speaker's table on a dais. That sort of stuff had been tried on aviators before and it hadn't worked.

The evening, which was admittedly a Large One, took off in the lobby when frantic groups rushed up and down snake dancing and chanting the sweet refrain:

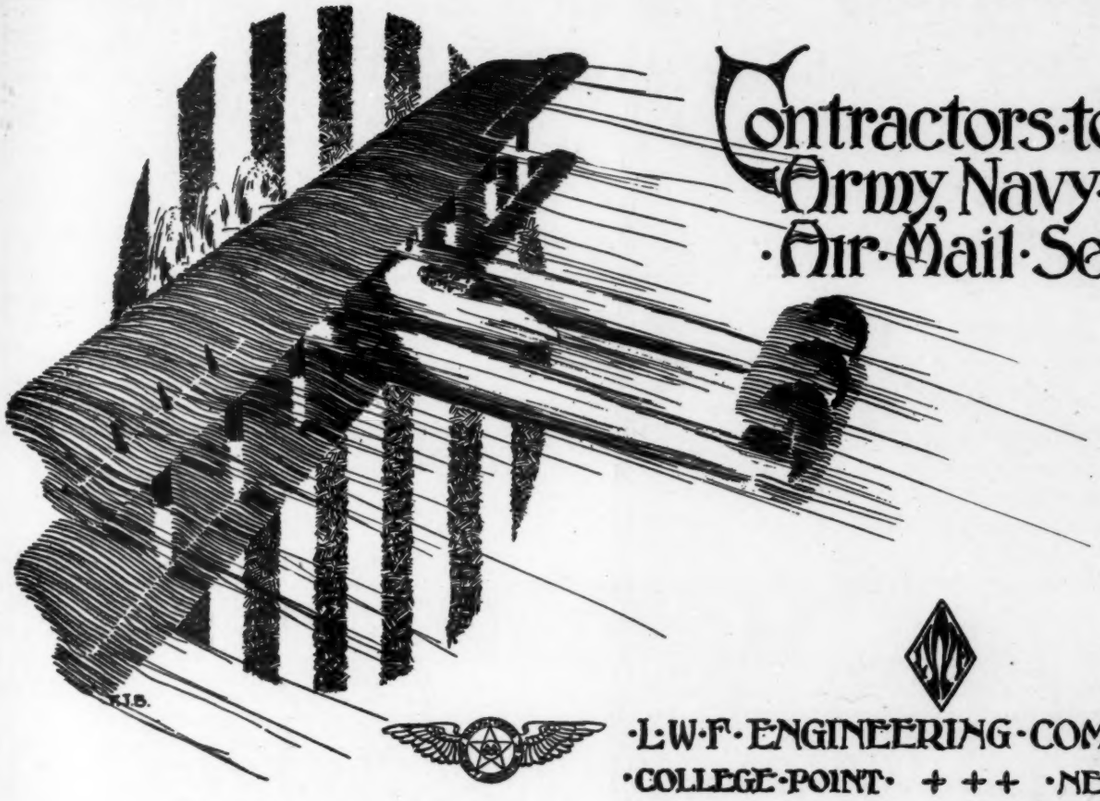
"I don't have to fly over Germany. I am a Kiwie now."

By the time the dining room door opened every one was flying at at least 1,000 feet, with the throttle wide open and gaining altitude every minute. Famous old squadrons which were able to get together in part for the evening were grouped together. There was the Ninetieth, a representation from the Lafayette Escadrille, the Two Hundred and Thirteenth, the Twenty-seventh, and the famous First Squadron, A. E. F., a table for Americans in the Royal Air Force and for prisoners of war. Pilots in the uniform of the Royal Flying Corps, the Belgian Air Service and the French Flying Corps mingled with the men of the American Air Service.

By a coincidence which every one considered curious, a pair of huge red dice hung in one corner of the balcony with the Five and Two up, making the charmed Seven. Every one conceded that the room had been decorated by persons of taste and discrimination, and a knowledge of the ways of the galloping ivories.

There was a dinner.

The dinner passed off very nicely. That is to say, waitresses scurried in and out with food, which no one took very seriously. Every one spent their time visiting from table to table, finding out that buddies who had been the best pals in the world were still the best pals, that memories of that time they went A. W. O. L. to Paris and got back without having the C. O. find out, were still warm. It was a time of times.



Contractors to the Army, Navy and Air Mail Service

L.W.F. ENGINEERING COMPANY inc.
COLLEGE POINT + + + NEW YORK

THE HOME INSURANCE COMPANY NEW YORK

ELBRIDGE G. SNOW, President

Home Office: 95 William St., New York

AIRCRAFT INSURANCE

Against the Following Risks

1. FIRE AND TRANSPORTATION.
2. THEFT (Of the machine or any of its parts).
3. COLLISION (Damage sustained to the plane itself).
4. PROPERTY DAMAGE (Damage to the property of others).

SPECIAL HAZARDS

Windstorm, Cyclone, Tornado—Passenger Carrying Permit—Stranding and Sinking Clause—Demonstration Permit—Instruction Permit

AGENTS IN CITIES, TOWNS AND VILLAGES THROUGHOUT THE UNITED STATES AND ITS POSSESSIONS, AND IN CANADA, MEXICO, CUBA, PORTO RICO AND CENTRAL AMERICA

Aircraft, Automobile, Fire and Lightning, Explosion, Hail, Marine (Inland and Ocean), Parcel Post, Profits and Commissions, Registered Mail, Rents, Rental Values, Riot and Civil Commotion, Sprinkler Leakage, Tourists' Baggage, Use and Occupancy, Windstorm

STRENGTH REPUTATION SERVICE

ORENCO

ADVANCE ANNOUNCEMENT

Those contemplating the purchase of a plane for private or commercial uses will be interested in the new

1921 Model "ORENCO TOURISTER",

a development of the record breaking ORENCO Type F which flew to 17,000 feet with four passengers, with only a 150 H.P. Wright-Hispano engine.

The new F-4 carries four or five passengers. Moderately priced and inexpensively maintained. Side door to cockpit—increased radius of action. Prompt deliveries assured. Complete information sent upon request together with interesting catalogue describing in detail the various ORENCO military and commercial types.

ORENCO AEROPLANES

THE ORDNANCE ENGINEERING CORPORATION, 120 BROADWAY, NEW YORK CITY

Contractors to the United States Government

IF YOU WANT TO FLY

We'll Make You a Pilot.

Our methods instil confidence from the start. You know you are flying with the most skilled instructors and the best equipment—from the safest field—that money can buy. Our average student qualifies for the International Pilots License after seven hours in the air. The cost is based on the time it takes to qualify with safety.

Philadelphia Aero-Service Corp.,
636 Real Estate Trust Bldg.,
PHILADELPHIA, PA.

RAYMOND F. HOWARD
AERONAUTICAL ENGINEER
DETROIT
DESIGNER OF COMMERCIAL AIRCRAFT

Immediate Delivery

Completely enclosed cabin type converted Three Passenger Lincoln Standard Biplane equipped with 150 H.P. Hispano-Suiza Motor.

Just the thing for Winter Flying
Send for photographs and prices.

HAMILTON AERO MFG. CO.
679 Layton Blvd., Milwaukee, Wis.

For Your Flying ←Boats Use

Upward of 5,000 gallons of Jeffery's Patent Waterproof Liquid Glue has been used by the U. S. Navy and War Department and as much more by the various manufacturers of seaplanes having government contracts.

L. W. Ferdinand & Co.
152 Kneeland Street
Boston, Mass., U. S. A.

INDEX TO ADVERTISERS

A

Aero Import Corporation 335
Aeromarine Plane & Motor Co..... 336
Aircraft Service Directory 334
American Propeller & Mfg. Co..... 333

B

Brewster-Goldsmith Corp. 333

C

Curtiss Aeroplane & Motor Corp..... 312

F

Ferdinand & Co., L. W..... 332

H

Hamilton Aero Mfg. Co..... 332
Home Insurance Co..... 331
Howard, Raymond M..... 332

L

L-F-W-Engineering Co., Inc..... 331

M

Martin, The Glenn L., Co..... 310

O

Ordnance Engineering Corp..... 332

P

Philadelphia Aero-Service Corp..... 332

T

Thomas-Morse Aircraft Corp..... 311

W

Wright Aeronautical Corp..... 329

DO YOU WANT

MORE SPEED

Paragon Propellers almost invariably increase the speed of the ship by three to ten per cent—sometimes more.

FASTER CLIMB

Paragon Propellers always increase the rate of climb at least ten per cent; often more than twenty per cent; sometimes thirty to forty per cent.

QUICKER GETAWAY

Paragon Propellers never fail to shorten the run. Very often they reduce the run by one-half.

You will never believe how much a **Paragon** increases the performance of your machine until you are one of the thousands who **know.**

Did you ever hear of a **Paragon Propeller** breaking in the air or failing in **any** respect?

Without **Paragon Propellers** you cannot get the full performance out of your ship.

AMERICAN PROPELLER & MFG. CO.

Baltimore, Md., U. S. A.

Oldest Propeller Engineers and Builders in the World.
Same Management Since 1909.

RELIABILITY PERFORMANCE

Combining in one dominant weekly the features which made *Aviation and Aeronautical Engineering* and *Aircraft Journal* distinctive in the technical, trade and news fields

AVIATION *and* AIRCRAFT JOURNAL

has the confidence and respect of not only the recognized manufacturers and authorities but of the discriminating reader who knows the difference between reliability and performance and sensationalism and press-agenting as applied both to aircraft and trade publications.

The News of the Entire Field Each Week, Original Articles on technical aeronautics and Air Transportation, and an Editorial Policy which seeks to direct aeronautical enthusiasm into business channels.

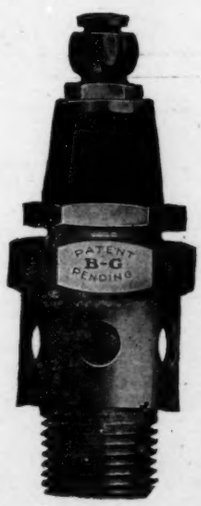
15 Cents a copy on leading news stands
52 Issues Four Dollars a Year

AVIATION AND AIRCRAFT JOURNAL

The Gardner, Moffat Company, Inc.
22 East 17th Street
New York

"The Spark Plug That Cleans Itself"

Self Cleaning
Self Cooling

B  G

Un-Breakable
Non-Fusible

"The Plug with the Infinite Spark"
Contractors to the U.S. Army Air Service

BREWSTER-GOLDSMITH CORPORATION
33 GOLD STREET, NEW YORK CITY

THE AIRCRAFT SERVICE DIRECTORY

Where to Procure Equipment and Services

AIRPLANES	ACCESSORIES	EXHIBITION WORK	PARCEL CARRYING
ENGINES	TRAINING FOR	AERIAL ADVERTISING	AERIAL PHOTOGRAPHY
PARTS	PILOT OR MECHANIC	PASSENGER CARRYING	AND MAPPING

The Mark of Quality
ARSCO SERVICE
TELE. FLATBUSH 1167

AIRCRAFT REPAIRS. STORAGE, TRUCKING, SERVICE, PARTS.

AIRCRAFT SERVICE & REPAIR CO.
338 Coney Island Ave.
BROOKLYN, N.Y.

NATIONAL ADVERTISING
20 weeks contract from Chicago to Galveston, Texas.
500,000 circulation. *Write for plan and price.*
JOHN H. ASHLEY, Auburn, Ind.
AMERICAN AERIAL ADVERTISING CO.
AUBURN, IND.
John H. Ashley, M'g'r. Frank Cameron, Pilot

LARGEST EXCLUSIVE JOBBERS IN U. S.
AIRCRAFT SUPPLIES
CERTIFIED UTILITY PARTS INSPECTED EQUIPMENT
For All Types Aircraft
Complete Stock Spares for Canucks and OX5 Engines
AIRCRAFT MATERIALS & EQUIPMENT CORP.
1405-9 SEDGWICK AVE., NEW YORK CITY
Cable Address: Unairco. 1920 Catalog on request

AERONAUTIC COURSES
"AERODYNAMICS" "MOTOR DYNAMICS"
"MOTOR DESIGN"
"AEROPLANE DRAFTING" "AEROPLANE DESIGN"
NEW YORK SCHOOL OF AERONAUTICS
BOX 106, GRAND CENTRAL POST OFFICE
Private Classes and Correspondence Courses
Under the supervision of Van Muffling & Marx
Consulting Aeronautical and Automotive Engineers

PROPER instrument equipment assures greater safety, better performance, higher efficiency. It will pay you to investigate.
PIONEER INSTRUMENT COMPANY
136 Havemeyer Street Brooklyn NY

Aerial Advertising a Specialty
Stunt Work a Hobby
Submit Inquiries to
The BLANCHARD AVIATION SCHOOL CO.
Airdrome Bayview Park, Toledo, Ohio

LONG ISLAND AVIATION COMPANY, Inc.
CENTRAL PARK, L. I.
Invites you to write for folder concerning its flying school and passenger carrying service.
Overhauling and repairing done on all types of machines. Hangar space to rent.
Information regarding exhibition flying furnished upon request

Designers and Builders of High Grade Aircraft
Sporting, Military, Marine and Commercial Types
Irwin Aircraft Co.
EUROPEAN METHOD OF MANUFACTURE
People's Bank B'l'd'g. Sacramento, Cal.
Aircraft and Parts Built to Order a Specialty
K. D.-Parts Furnished to Build Motorcycle Biplane

LANDING FIELD GUIDE and PILOT'S LOG BOOK
BY CAPT. BRUCE EYTINGE
Size 4½ x 7 inches, convenient for pocket. Lists 1150 Landing Fields; Manufacturers, Agents, Clubs, Air Rules, Routes, etc: All Aviation facilities in the U. S. essential for Pilots and those interested in Aviation.
Pilot's Log Book ruled for record of machine, motor and flying.
SECOND EDITION $2.00 POSTPAID AVIATION MAPS
BRUCE EYTINGE, 4554 Park Ave., N. Y. City

NORTHWESTERN CANADIAN CURTISS
DISTRIBUTORS (Price $3,500)
We Also Operate an Extremely Efficient Flying School
Learn to "Fly With Security"
SECURITY AIRCRAFT COMPANY
MINNEAPOLIS, MINN.

WRITE for INFORMATION
About this Directory Advertising
IT'S BRINGING RESULTS

WING COVERING
Doping, Pigmenting, Enameling, Varnishing accurately, quickly and economically done at your own hangars if desired.
G. VOISIN, Expert
20 years of practical experience
Tel. 139 W. Hasb. Hgts. 236 Franklin Ave., Hasbrouck Heights, N.J

D'ORCY'S AIRSHIP MANUAL
"An International register of the World's Airships with a Compendium of Aerostatics"
PRICE $4.00
AVIATION 22 E. 17 St., N. Y. City

This Advertising Space
if used regularly will pay for itself many times over.
Write for Rates